

AGENDA
REGULAR MEETING OF THE CITY COUNCIL
CITY OF LAKEWOOD, COLORADO
Hybrid Meeting
Lakewood Civic Center
480 South Allison Parkway
December 13, 2021
7:00 P.M.
Council Chambers & Zoom

To watch the Council meeting live, please use either one of the following links:

City of Lakewood Website: <https://www.Lakewood.org/CouncilVideos>

or

Lakewood Speaks: <https://lakewoodspeaks.org/>

To join the City Council Meeting for Public Comment:

By Computer: <https://lakewood.zoom.us/j/98241812713>

By iPad, iPhone, or Android device on the Zoom App, enter webinar ID: 982 4181 2713

By Telephone: 720-707-2699

Webinar ID: 982 4181 2713, #

Participant ID: #

Press *9 to Request to Speak, you will be prompted when to speak.

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ITEM 1 – CALL TO ORDER

ITEM 2 – ROLL CALL

ITEM 3 – PLEDGE OF ALLEGIANCE

ITEM 4 – INDUCTION CEREMONY

ITEM 5 – STATEMENT OF CONFLICT OF INTEREST

ITEM 6 – PUBLIC COMMENT

Anyone who would like to address the Council on any matter other than an agenda item will be given the opportunity. Speakers should limit their comments to three minutes.

ITEM 7 – EXECUTIVE REPORT

CITY MANAGER

**CONSENT AGENDA
ORDINANCES ON FIRST READING**

(Ordinances are on first reading for notice and publication only; public hearings are held on second reading)

ITEM 8 – RESOLUTION 2021-50 – ADOPTING THE JEFFERSON COUNTY HAZARD MITIGATION PLAN DATED JULY 2021

ITEM 9 – RESOLUTION 2021-51 – APPROVING AN INTERGOVERNMENTAL AGREEMENT WITH THE MILE HIGH FLOOD DISTRICT AND THE CITY OF WHEAT RIDGE FOR A MAJOR DRAINAGEWAY PLAN AND A FLOOD HAZARD AREA DELINEATION FOR LENA GULCH AND ITS TRIBUTARY H

ITEM 10 – RESOLUTION 2021-52 – AUTHORIZING THE PURCHASE OF REAL PROPERTY FOR OPEN SPACE AND PARK PURPOSES FROM THE DANIEL WILSONPORTER LIVING TRUST, INCLUDING ACCEPTANCE OF A DEED THEREFOR, AND NAMING THE PROPERTY PORTER PARK

ITEM 11 – APPROVING MINUTES OF CITY COUNCIL MEETINGS

Regular Meeting

November 22, 2021

ITEM 12 – ACCEPTING MINUTES OF THE BOARDS AND COMMISSIONS

LAC Executive Committee Meeting

July 7, 2021

LAC Executive Committee Meeting

September 1, 2021

END OF CONSENT AGENDA

RESOLUTIONS

ITEM 13 – RESOLUTION 2021-53 – APPROVING LAKEWOOD’S PARTICIPATION IN THE COLORADO OPIOIDS SETTLEMENT MEMORANDUM OF UNDERSTANDING (“MOU”) REGARDING THE SETTLEMENT OF CLAIMS AGAINST THE “BIG 3” OPIOID DISTRIBUTORS (MCKESSON, CARDINAL HEALTH, AND AMERISOURCEBERGEN) AND OPIOID MANUFACTURER JOHNSON & JOHNSON

ITEM 14 – GENERAL BUSINESS

ITEM 15 – MAYOR AND CITY COUNCIL REPORTS

- A. COUNCIL MEMBERS BY WARD
- B. MAYOR

ITEM 16 – ADJOURNMENT

STAFF MEMO

DATE OF COUNCIL MEETING: DECEMBER 13, 2021 / AGENDA ITEM NO. 8

To: Mayor and City Council

From: Daniel McCasky, Police Chief, 303-987-7102
Jay Hutchison, Director of Public Works, 303-987-7901
Travis Parker, Director of Planning, 303-987-7908

Subject: **A RESOLUTION ADOPTING THE 2021 JEFFERSON COUNTY HAZARD MITIGATION PLAN**

SUMMARY STATEMENT: The City participated in the recent update of the Jefferson County Hazard Mitigation Plan. The Plan has been approved by the State of Colorado and the Federal Emergency Management Agency. The final step in the approval process is the formal adoption by participating agencies. Approval of the proposed resolution is recommended by the Police, Public Works, Community Resources and Planning departments.

BACKGROUND INFORMATION: Hazard mitigation planning is the process through which natural and man-made 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 and prioritized for implementation. Hazard mitigation is defined by the Federal Emergency Management Agency as “any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event.”

The City of Lakewood was contacted in February of 2019 to solicit interest in the update of the Jefferson County Multi-Hazard Mitigation Plan – Comprehensive Update April 2016 (“2016 Plan”). The City, recognizing the need and great value that a Hazard Mitigation Plan provides, submitted a formal letter of commitment of its full participation in the update. Staff from the Lakewood Police, Public Works, Planning, and Community Resources departments met regularly with the plan development consultant team, Jefferson County, other participating jurisdictions, and the public in order to update this plan.

This plan builds on almost 20 years of mitigation planning in Jefferson County, starting with participation in the 2003 Denver Regional Council of Governments (DRCOG) Hazard Mitigation Plan. Jefferson County developed its first stand-alone HMP in 2010, updated the plan in 2016, and is again updating it in 2021. The current Plan up for adoption is a comprehensive update to the 2016 Plan. All mentioned Hazard Mitigation Plans apply to unincorporated and incorporated areas of the County.

The 2021 Plan consists of a base plan (296 pages), appendices (196 pages) and annexes (342 pages). The base plan and appendices outline the purpose, scope, planning process, risk assessment, and mitigation strategies to address vulnerabilities identified throughout the County. Every municipality and certain other agencies within Jefferson County have an Annex that applies specifically to its jurisdiction. Annex D contains Lakewood’s

community profile, specific hazards and vulnerabilities, asset inventory, growth and development trends and mitigation actions currently under way or planned for the future.

For the 2021 update, a broad range of potential hazards were evaluated including:

- Hazards that can be prevented or reduced, such as damage from swelling soils or flooding;
- Hazards that can be managed during an event, such as severe snow storms and flooding; and
- Hazards for which little can be done until after an event, such as hailstorms.
- Additionally, this plan is also the first to address two non-natural hazards: Pandemic and Cyber Attack

In most cases, Lakewood has emergency response plans in place to manage the consequences of these events and respond to the cascading problems caused by large scale disasters. These plans make the emergency response more efficient and timelier, protect health and safety, minimize community disruption, and reduce costs. By contrast, the Hazard Mitigation Plan focuses specifically on what can be done preventatively to reduce the occurrence and/or impacts of a disaster before it happens through mitigation actions and other risk reduction projects.

Adoption of the 2021 Plan is necessary for Lakewood to be eligible for certain federal and state funding for hazard mitigation and disaster recovery assistance. It also aligns with the planning elements of the National Flood Insurance Program's Community Rating System ("CRS") which can lead to lower flood insurance premiums in the communities. Through the CRS, Lakewood's flood mitigation and management efforts currently result in a premium savings of 20% for all flood insurance policy holders in the community.

The previous version of this Plan (2016) identified 6 mitigation initiatives that were to be explored. The City accomplished 3 of these initiatives (Revise the Emergency Operations Plan (EOP) for Maple Grove Reservoir, Achieve StormReady recognition through the National Weather Service, and Update of the Energy Assurance Plan). One action was deleted due to cost constraints and feasibility (Burying power lines to a radio repeater site), and 2 actions were continued (Ongoing implementation of sound floodplain management, and Expansion of the Flood Hazard Inventory Tool with the Mile High Flood District).

The 2021 Update includes eight mitigation initiatives, including the two previously mentioned. The first is the creation of a flood impact assessment tool in conjunction with the Mile High Flood District. The second is improvements to North Dry Gulch drainage. The third is focused on Grid Resiliency to reduce the risk of power outages. The fourth addresses increasing local awareness of climate change impacts that may increase the frequency and/or intensity of certain hazards. The fifth would be to explore how to identify socially vulnerable communities and improve and expand community social networks to improve response and health outcomes during emergency situations. The sixth and final initiative will look at cooling and carbon sequestration in the City to combat the impacts of extreme heat and drought.

Jefferson County has also created a multi-jurisdiction All-Hazard Mitigation Advisory Committee (Jeffco AHMAC) that will act as the County's central forum for all-hazard mitigation issues. Lakewood staff have been nominated to this committee to ensure the City's interests are represented. The AHMAC will also work to disseminate hazard mitigation ideas and activities, pursue the implementation of the HMP, and keep the concepts of mitigation in the forefront of community decision-makers by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters. It will also serve to monitor multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists.

The State of Colorado and FEMA have reviewed and approved the 2021 Plan, which is available for review on Lakewood Speaks. Adoption will be for the 2021 Plan in its entirety, including the base plan, appendices, and annexes.

BUDGETARY IMPACTS: Adoption of the Plan does not commit any City of Lakewood dollars. The City provided in-kind matching for its share of the plan creation. Adoption qualifies the City to apply for grant funding opportunities to fund pre- and post-disaster mitigation projects. Not adopting could have a negative impact on the City's rating in the Community Rating System as part of the National Flood Insurance Program.

STAFF RECOMMENDATIONS: Staff recommends that the City of Lakewood adopt the proposed resolution.

ALTERNATIVES: If the City chooses not to adopt the Plan, the City would not have an approved Hazard Mitigation Plan and would be precluded from applying for pre- and post-disaster hazard mitigation grants.

PUBLIC OUTREACH: Public Outreach was a fundamental step of the update of the Hazard Mitigation Plan. Numerous activities took place in order to engage the public, including:

- Online public survey requesting personal experience with hazard events; public perception of hazard significance; what mitigation measures should be pursued. Conducted January 6-31, 2021
- The City Manager provided an update to City Council during the executive report at the City Council's January 11, 2021 public meeting.
- 1st Public workshop providing overview of mitigation planning and plan update process; introduction to hazards and risk assessment; mitigation goals and objectives. Conducted January 14th
- 2nd Public workshop providing overview of draft plan; solicitation of feedback. Conducted June 8th
- Video recordings of the public workshops were posted on YouTube.
- Public review and comment of draft plan. The Plan and all supporting documents were available for review in a virtual public room. Conducted June 7th to 25th
- Numerous advertisements in the Friday Report and City social media accounts.
- Notice to the public of this meeting, during which City Council will consider the proposed resolution, occurred through the normal channels for a City Council meeting.

NEXT STEPS: Lakewood staff will continue to work on and pursue projects that will reduce vulnerability to the City's most impactful hazards, including participation in the Jefferson County All-Hazard Mitigation Committee.

ATTACHMENTS: Resolution 2021-50
2021 Jefferson County Hazard Mitigation Plan
Appendices
Annexes

REVIEWED BY: Kathleen E. Hodgson, City Manager
Benjamin B. Goldstein, Deputy City Manager
Alison McKenney Brown, City Attorney

A RESOLUTION

ADOPTING THE JEFFERSON COUNTY HAZARD MITIGATION PLAN DATED JULY 2021

WHEREAS, the Lakewood City Council (the "City Council") recognizes the threat hazards, both natural and man-made, pose to people and property within the community;

WHEREAS, the City Council finds that planning for and undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences;

WHEREAS, an adopted Hazard Mitigation Plan is required as a condition of future funding for hazard mitigation projects under multiple federal and state pre- and post-disaster mitigation grant programs;

WHEREAS, officials of the Colorado Division of Homeland Security and Emergency Management and Federal Emergency Management Agency, Region VIII, have reviewed and approved the Jefferson County Hazard Mitigation Plan dated July 2021 (the "2021 Hazard Mitigation Plan"); and

WHEREAS, the City Council hereby finds and determined it to be in the best interests of the residents of the City of Lakewood to adopt the 2021 Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Lakewood, Colorado, that:

SECTION 1. The Hazard Mitigation Plan is hereby adopted.

SECTION 2. The City Manager and City Clerk are hereby authorized and directed to sign and attest, respectively, the Hazard Mitigation Plan on behalf of the City.

SECTION 3. This Resolution shall become effective immediately upon its adoption.

INTRODUCED, READ AND ADOPTED by a vote of __ for and __ against at a regular meeting of the City Council on December 13, 2021, at 7 o'clock p.m. at Lakewood Civic Center, South Building, 480 South Allison Parkway, Lakewood, Colorado.

Adam Paul, Mayor

ATTEST:

Bruce Roome, City Clerk

Approved as to form:

Alison McKenney Brown, City Attorney



Jefferson County

Hazard Mitigation Plan

State Review Draft

July 2021



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Annex B – City of Edgewater

Annex C – City of Golden

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Annex O – Inter-Canyon Fire Protection District
Annex P – North Fork Fire Protection District
Annex Q – West Metro Fire Protection District
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Annex U – Town of Lakeside (not updated)
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Appendices

Appendix A – Approval and Adoption

Appendix B – Hazard Mitigation Planning Committee

Appendix C – Planning Process Documentation

Appendix D – Public Survey Results

Appendix E – Mitigation Alternatives

Appendix F – References

Appendix G – Definitions and Acronyms

Appendix H – Map of Critical Facilities (Not For Public Release)

1 Introduction

1.1 Executive Summary

The following jurisdictions have prepared and adopted this 2021 update of the Jefferson County Hazard Mitigation Plan (HMP):

- Jefferson County
- City of Arvada
- City of Edgewater
- City of Golden
- City of Lakewood
- Town of Morrison
- City of Wheat Ridge
- Arvada Fire Protection District
- Elk Creek Fire Protection District
- Evergreen Fire Protection District
- Fairmount Fire Protection District
- Foothills Fire Protection District
- Genesee Fire Protection District
- Golden Gate Fire Protection District
- Indian Hills Fire Protection District
- Inter-Canyon Fire Protection District
- Jefferson Conservation District
- Lookout Mountain Water District
- North Fork Fire Protection District
- West Metro Fire Protection District
- Denver Water

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from disasters or hazardous events. Studies have found that hazard mitigation is extremely cost-effective, with every dollar spent on mitigation saving an average of \$6 in avoided future losses. The Federal Emergency Management Agency (FEMA) requires that hazard mitigation plans be updated every five years for the jurisdictions to be eligible for federal mitigation assistance. All sections of the 2016 Jefferson County Hazard Mitigation Plan were reviewed and updated to address natural and human-caused hazards for the purpose of saving lives and reducing losses from future disasters or hazard events.

This Plan will serve as a blueprint for coordinating and implementing hazard mitigation policies, programs, and projects in Jefferson County. It provides a list of mitigation goals and related actions that may assist Jefferson County and its municipalities in reducing risk and preventing loss from future hazard events. The impacts of hazards can often be lessened or even avoided if appropriate actions are taken before events occur. By reducing exposure to known hazard risks, communities will save lives and property and minimize the social, economic, and environmental disruptions that commonly follow hazard events.

This Plan was also developed to maintain Jefferson County's and participating jurisdictions' eligibility for federal disaster assistance, specifically the Federal Emergency Management Agency's (FEMA), Hazard Mitigation Assistance (HMA) grants including the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and Building Resilient Infrastructure and Communities (BRIC) grant program, as well as the Rehabilitation of High Hazard Potential Dam (HHPD) grant program.

Section 1 contains the Plan Introduction and Executive Summary.

Section 2 Community Profile describes the planning area, consisting of Jefferson County and the participating jurisdictions listed above, with updated information on demographics, social vulnerability, and changes in development. It includes an assessment of programs and policies currently in place across the County to reduce hazard impacts or that could be used to implement hazard mitigation activities, and identifies opportunities to enhance those capabilities.

Section 3 Planning Process describes the process followed to update the Plan. A broad range of public and private stakeholders, including agencies, local businesses, nonprofits, and other interested parties were invited to participate. Public input was sought throughout the planning process including online surveys and public review of the draft Plan.

Section 4 Hazard Identification and Risk Assessment identifies the natural and human-caused hazards of greatest concern to the County, and describes the risk from those hazards. The information generated through the risk assessment helps communities to prioritize and focus their efforts on those hazards of greatest concern and those assets or areas facing the greatest risk(s). The best available information on

the impacts of changing weather conditions were taken into account for each hazard. The hazards profiled in the 2021 Plan and their assessed significance are shown in the following table.

Table 1-1 Hazards Identification Summary

Hazard	Geographic Extent	Probability of Future Occurrence	Potential Severity/Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Significant	Occasional	Critical	High
Drought	Extensive	Likely	Critical	Medium
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Extensive	Likely	Limited	Medium
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Critical	High
Hailstorm	Significant	Likely	Critical	High
Landslide/Debris/Rockfall	Limited	Likely	Limited-Negligible	Medium
Lightning	Limited	Highly Likely	Limited	Medium
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Medium
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Significant	Highly Likely	Limited	Medium

Section 5 Mitigation Strategy describes what the County and jurisdictions will do to reduce their vulnerability to the hazards identified in Section 4. It presents the goals and objectives of the mitigation program, and details a broad range of targeted mitigation actions to reduce losses from hazard events.

Section 6 Plan Implementation and Maintenance details how the Plan will be implemented, monitored, evaluated, and updated, as well as how the mitigation program will be integrated into other planning mechanisms.

Following the base plan, annexes for each participating jurisdiction go into greater detail about how the risk from natural and human-caused hazards varies across the planning area, and lists each jurisdictions' identified mitigation actions.

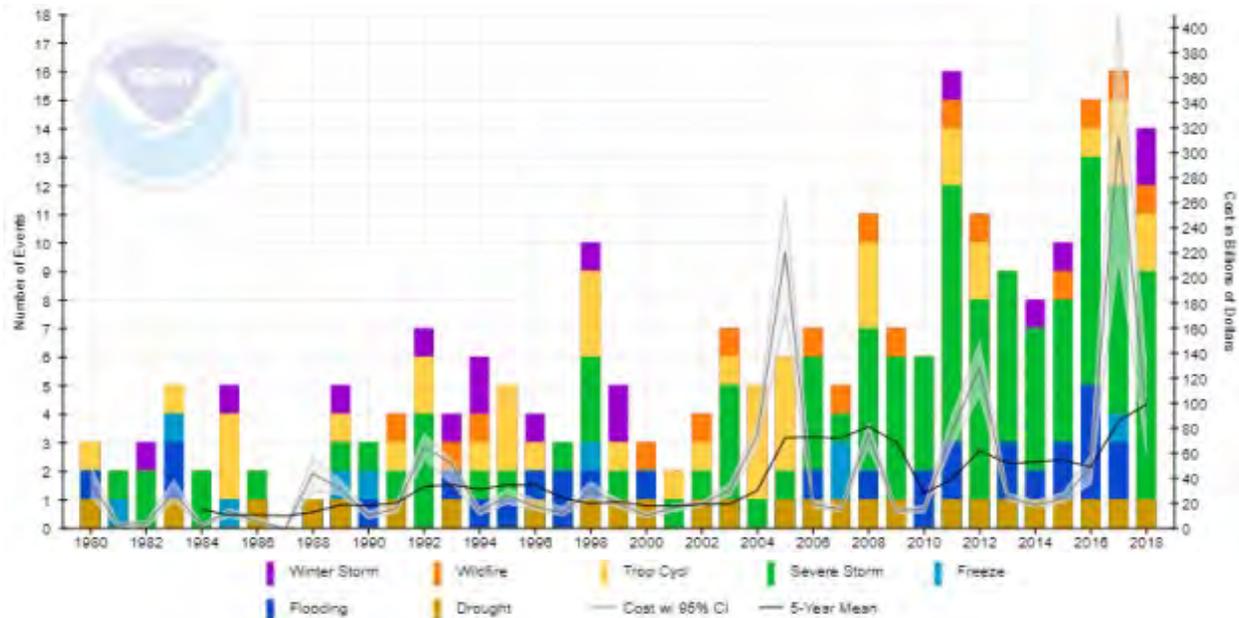
It is important that local decision-makers stay involved in mitigation planning to provide new ideas and insight for future updates to the Jefferson County Hazard Mitigation Plan. As a long-term goal, the Hazard Mitigation Plan and the mitigation strategies identified within will be fully integrated into daily decisions and routines of local government. This will continue to require dedication and hard work, and to this end, this Plan update continues efforts to further strengthen the resiliency of Jefferson County.

1.2 Background

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. Additional expenses to insurance companies and

nongovernmental organizations are not reimbursed by tax dollars, making the costs of disasters several times higher than calculated amounts. Figure 1-1 shows the number and type of natural disasters in the US that have done more than one billion dollars in damage, showing how the frequency and cost of major disasters have risen over the past several decades.

Figure 1-1 Billion-Dollar Disasters in the US, 1980-2018



Source: NOAA

However, some types of hazards are predictable, and much of the damage caused by these events can be mitigated through the use of various zoning, construction and permitting vehicles and other preventative actions. 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. 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, as illustrated in Figure 1-2.

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007. Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act or DMA. While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

Figure 1-2 Financial Benefits of Hazard Mitigation

	ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS
Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1	6:1
Cost (\$ billion)	\$1/year	\$4/year	\$520	\$0.6	\$27
Benefit (\$ billion)	\$13/year	\$16/year	\$2200	\$2.5	\$160
 Riverine Flood	6:1	5:1	6:1	8:1	7:1
 Hurricane Surge	not applicable	7:1	not applicable	not applicable	not applicable
 Wind	10:1	5:1	6:1	7:1	5:1
 Earthquake	12:1	4:1	13:1	3:1	3:1
 Wildland-Urban Interface Fire	not applicable	4:1	2:1	not applicable	3:1

Copyright © 2019 The National Institute of Building Sciences

Source: National Institute of Building Sciences, Natural Hazard Mitigation Saves: 2019 Report

This plan builds on almost 20 years of mitigation planning in Jefferson County, starting with participation in the 2003 Denver Regional Council of Governments (DRCOG) Hazard Mitigation Plan. Jefferson County developed its first stand-alone HMP in 2010, updated the plan in 2016, and has again updated it in 2021.

This plan is a comprehensive update to the 2016 plan. Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. The Jefferson County planning area is committed to reducing future disaster impacts and maintaining eligibility for federal funding.

1.3 Purpose and Scope

Jefferson County and the participating jurisdictions have prepared this multi-hazard mitigation plan to better protect the people and property of the County from the effects of hazard events. This plan demonstrates the community’s commitment to reducing risks from hazards and serves as a tool to help decision-makers direct mitigation activities and resources. This plan was also developed to position Jefferson County and its participating jurisdictions for the eligibility of certain federal mitigation funding assistance, specifically, the Federal Emergency Management Agency’s (FEMA) Hazard Mitigation Assistance grant programs (HMA), which include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). This plan also aligns with the planning elements of the National Flood Insurance Program’s Community Rating System (CRS), which provides for lower flood insurance premiums in CRS-participating communities.

Jefferson County remains dedicated to implementing the actions and strategies outlined in this updated Hazard Mitigation Plan. The Plan will be maintained regularly to address changes in hazards or vulnerabilities, and will be updated within the next five years.

2 Community Profile

2.1 Geography and Climate

Situated in the north-central part of Colorado, west of the City of Denver, Jefferson County is split between foothills on the west and plains on the east. The majority of the population is located in the northern portion of the county, while the southern portion is dominated by Pike National Forest. The county is 773 square miles in size, and 653 square miles are unincorporated areas. The landscape is comprised of approximately 72% mountains and 28% plains. The ecologies located in the County include prairies, and forests. This area includes a significant intermix between developed and forest areas, which increases the wildfire risks in those regions. Table 2-1 breaks down land ownership in the County.

Table 2-1 Jefferson County Land Ownership

Land Ownership	Acres	% of Total
Private Lands	289,480	58.4%
Conservation Easement	9,737	2.0%
Federal Lands	111,966	22.6%
Forest Service	103,248	20.8%
BLM	355	0.1%
National Park Service	0	0.0%
Military	3,093	0.6%
Other Federal	5,270	1.1%
State Lands	10,412	2.1%
State Trust Lands*	3,087	0.6%
Other State	7,325	1.5%
Tribal Lands	0	0.0%
City, County, Other	83,542	16.9%
Total	495,399	

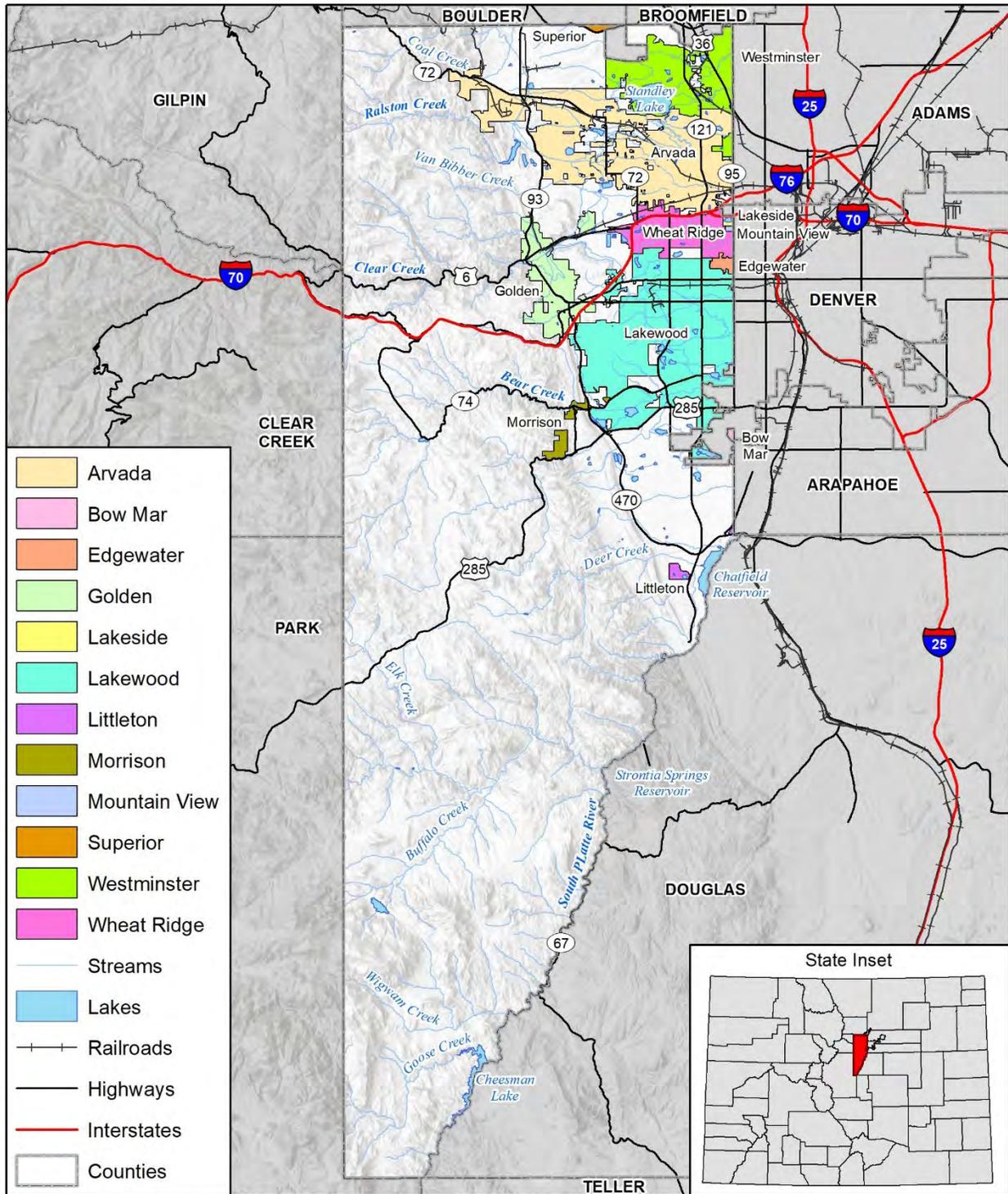
Source: U.S. Geological Survey Protected Areas Database of the United States (PADUS)

Approximately 40% of the unincorporated areas of the County are reserved as parks, open space, and open land. Jefferson County is home to three state parks: Golden Gate Canyon State Park, Staunton State Park, and Chatfield State Park offer a variety of activities, trails, boating, and other events. The County also has a robust network of open space parks (Jefferson County Open Space, or JCOS) with 27 regional park units, 252 miles of trails, and 56,000 acres preserved. Additionally, the Denver Mountain Park system includes 10,271 acres in Jefferson County.

Jefferson County is marked by some distinctive geologic features. The hogback formations, rock formations that rise sharply just at the base of the foothills, provide a steep valley between the formation and the formal foothill regions, are unique in appearance, and easily identified by travelers. One of the most notable elements of the hogback is the Dinosaur Ridge formation, where fossils and dinosaur tracks are easily accessible. Other notable geologic features include Green Mountain, North and South Table Mountains, and Red Rocks Amphitheater and Park. Several large reservoirs are located in the County as well, including, Blunn, Chatfield, Bear Creek, Ralston, Marston, Bow Mar, Sloan, and Standley Lake. The site of the former Rocky Flats facility is also located in the County and is now a National Wildlife Refuge (US Fish and Wildlife Service).

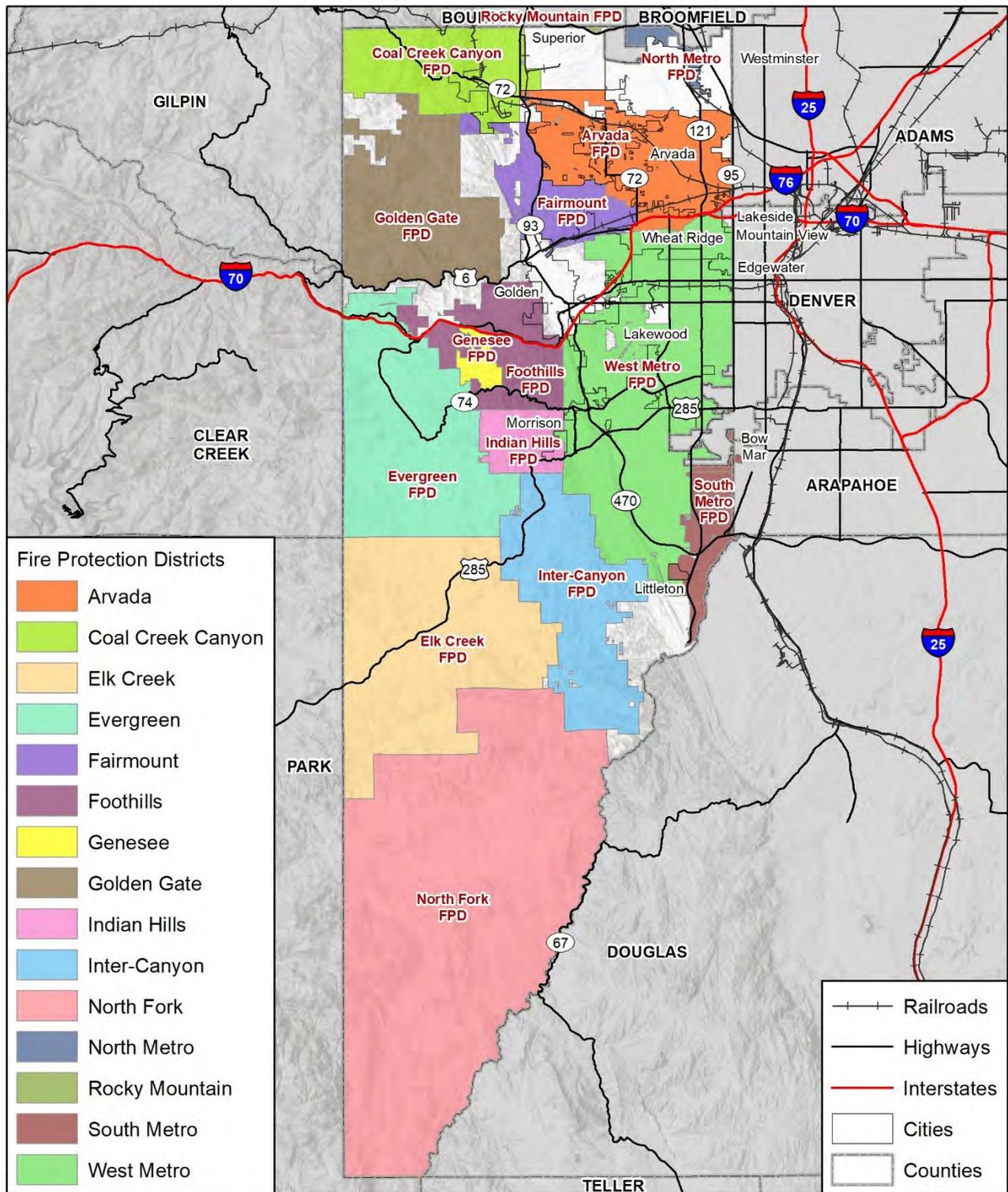
Jefferson County's climate is fairly temperate but demonstrates four distinct seasons. The average temperature in July (the hottest month) is 74°F and in January (the coldest month) is 30°F. The county averages 15.4 inches of precipitation and 60.3 inches of snow. There are periods of extreme temperature variations, but they are generally accompanied by other climactic considerations such as drought or winter storms. A base map of Jefferson County is shown in Figure 2-1. Figure 2-2 shows the various fire protection districts that serve the County.

Figure 2-1 Jefferson County Base Map



Map compiled 1/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

Figure 2-2 Jefferson County Fire Protection Districts



Map compiled 1/2021;
intended for planning purposes only.
wood. Data Source: Jefferson County, CDOT

2.2 Population

Jefferson County has grown by an estimated 39,969 residents since the 2010 U.S. Census, totaling 574,798 people in 2019. This equals an average yearly growth rate of 0.6% for this 9-year period. The majority of the population resides in the unincorporated areas of the county and the cities of Westminster, Lakewood, Arvada, and Littleton. Population estimates for 2015 and 2019 are provided in Table 2-2.

Table 2-2 Jefferson County Population

Jurisdiction	2015 Population (est.)	2019 Population (est.)	% Change 2015 to 2019
Arvada	111,658	118,746	6.35%
Edgewater	5,237	5,328	1.74%
Golden	19,780	20,693	4.62%
Lakewood	147,836	155,146	4.94%
Morrison	394	415	5.33%
Wheat Ridge	30,863	31,331	1.52%
Unincorporated	236,566	243,139	2.78%
Total	552,334	574,798	4.07%

Source: Quickfacts.census.gov

Select Census and American Community Survey demographic and social characteristics for Jefferson County are shown in Table 2-3, with comparisons to the State and the Country summarized in Table 2-4. Characteristics are for the entire County.

Table 2-3 Jefferson County Demographic and Social Characteristics, 2015-2019

Jefferson County	2015	2019	% Change
Population	552,334	574,798	4.07%
Median Age	40.4	40.3	-0.2%
Total Housing Units	232,477	240,956	3.6%
Housing Occupancy Rate	95.9%	96.4%	0.5%
% of Housing Units with no Vehicles Available	4.3%	3.9%	-9.3%
Median Home Value	\$279,500	\$397,700	42.3%
Unemployment Rate	4.1%	3.6%	-12.2%
Mean Travel Time to Work (minutes)	27	28	3.7%
Median Household Income	\$70,164	\$82,986	18.3%
Per Capita Income	\$37,065	\$44,119	19.0%
% of Individuals Below Poverty Level	8.5%	7.1%	-16.5%
% Without Health Insurance	14.2%	5.5%	-61.3%
# of Households	222,892	232,284	4.2%
Average Household Size	2.4	2.4	0.0%
% of Population Over 25 with High School Diploma or Higher	94.0%	94.5%	0.5%
% of Population Over 25 with Bachelor's Degree or Higher	41.6%	45.2%	8.7%
% with Disability	9.6%	10.0%	4.2%
% Speak English less than "Very Well"	3.1%	3.0%	-3.2%

Source: US Census and American Community Survey

Table 2-4 Jefferson County Demographic and Social Characteristics Compared to the State and the Nation

Demographic & Social Characteristics (as of 2019)	County	Colorado	U.S.
Median Age	40.3	36.7	38.1
Housing Occupancy Rate	96.4%	90.0%	87.9%
% of Housing Units with no Vehicles Available	3.9%	5.1%	8.6%
Median Home Value	\$397,700	\$343,300	\$217,500
Unemployment	3.6%	4.3%	5.3%
Mean Travel Time to Work (minutes)	28	25.8	26.9
Median Household Income	\$82,986	\$72,331	\$62,843
Per Capita Income	\$44,119	\$38,226	\$34,103
% of Individuals Below Poverty Level	7.1%	10.3%	13.4%
% Without Health Insurance	5.5%	7.6%	5.1%
Average Household Size	2.40	2.56	2.62
% of Population Over 25 with High School Diploma or Higher	94.5%	91.7%	88.0%
% of Population Over 25 with bachelor's degree or Higher	45.2%	40.9%	32.1%
% with Disability	10.0%	10.6%	12.6%
% Speak English less than "Very Well"	3.0%	5.8%	8.4%

Source: US Census and American Community Survey.

2.3 Social Vulnerability

Local vulnerability to disasters depends on more than the relationship between a place and its exposure to hazards. Social vulnerability to disasters refers to the characteristics and situation of a person or group that influence their capacity to anticipate, cope with, resist, or recover from the impact of a hazard. It is determined by a number of pre-existing social and economic characteristics, including race, age, income, renter status, or institutionalized living. Very often, the impacts of hazards fall disproportionately on the most underserved or marginalized people in a community – people with low income, children, people who are aging, people with disabilities, and minorities. During emergencies, for example, self-evacuation can be difficult or nearly impossible for individuals who are disabled or institutionalized. Additionally, the willingness of an individual/family to invest in residential mitigation actions is often limited if their home is a rental and they are averse to investing money in long-term mitigation activity. Not only do conditions like these limit the ability of some communities to get out of harm's way, they also decrease the ability of communities to recover from and thrive in the aftermath of a disaster event.

The term social vulnerability is used here to describe communities more vulnerable to a risk or hazard, such as high vulnerability due to wildfires or floods based upon geography, topography, hydrology or weather. Referencing people themselves directly with the term vulnerable can cause individual community members to be seen with a deficit lens, leaving the impression that the vulnerability is a result of the lack of responsibility and/or adequate planning of the individual. Instead, vulnerability occurs when the system that the individual is part of fails to provide equitable accessibility to resources or services, known as access and functional needs, for the individual to survive, respond to, and recover from an event. Barriers that may be exacerbated by certain social and economic factors – including race, age, income, renter status, or institutionalized living – directly affect a community's ability to prepare for, respond to, and recover from hazards and disasters. The concept of social vulnerability helps explain why communities often experience a hazard event differently, even when they experience the same amount of physical impacts or property loss.

For the 2021 plan update, the concept of social vulnerability has been introduced into the hazard risk analysis to more effectively identify hazard risk experienced by the most vulnerable residents and communities within the county. The social vulnerability assessment is designed to improve local decision making, hazard prioritization, and emergency management activities. By incorporating social vulnerability

into the risk assessments of individual hazards, local communities can identify more vulnerable areas and tailor their mitigation actions to accommodate all members of their community, including the most sensitive groups.

Social vulnerability analysis is particularly useful in the context of hazard mitigation planning because it can reveal disparities within a community that make a difference when it comes to the ability of residents to mitigate, prepare, evacuate, mobilize resources, and recover from disasters. Areas on the map that have medium to high social vulnerability represent areas where age, poverty, race/ethnicity, or special needs factors may make it more difficult for people to prepare, respond, and recover from hazard events. Social vulnerability information can also be used to help communities design effective and appropriate local risk communication and hazard mitigation outreach activities.

The Center for Disease Control and Prevention (CDC) has developed a social vulnerability index (SoVI) as a way to measure the resilience of communities when confronted by external stresses such as natural or human-caused disasters or disease outbreaks. The SoVI is broken down at the census tract level and provides insight into particularly vulnerable populations to assist emergency planners and public health officials identify communities more likely to require additional support before, during, and after a hazardous event. The SoVI index combines four main themes of vulnerability, which are in turn broken down into subcategories for a total of 15 vulnerability factors. Table 2-5 displays those 15 factors and shows how Jefferson County compares to other counties in Colorado and nationally. The rankings show the percentage of counties that Jefferson County is more vulnerable than, i.e. – high numbers reflect greater relative vulnerability.

Table 2-5 Social Vulnerability in Jefferson County

Variable	Ranking Compared to Colorado Counties	Ranking Compared to US Counties	Relative Vulnerability
Socioeconomic status	13%	2%	Low
Below poverty	16%	6%	Low
Unemployment	32%	21%	Low
Income	11%	3%	Low
No high school diploma	29%	5%	Low
Household composition and disability	32%	2%	Low
Age 65 or older	38%	26%	Below Average
Age 17 or younger	49%	25%	Below Average
Disability	29%	6%	Low
Single-parent households	40%	21%	Low
Minority status and language	46%	67%	Above Average
Minority	49%	59%	Above Average
Speaking English “less than well”	44%	69%	Above Average
Housing and transportation	21%	20%	Low
Multi-unit structures	81%	95%	High
Mobile homes	3%	4%	Low
Crowding	17%	30%	Below Average

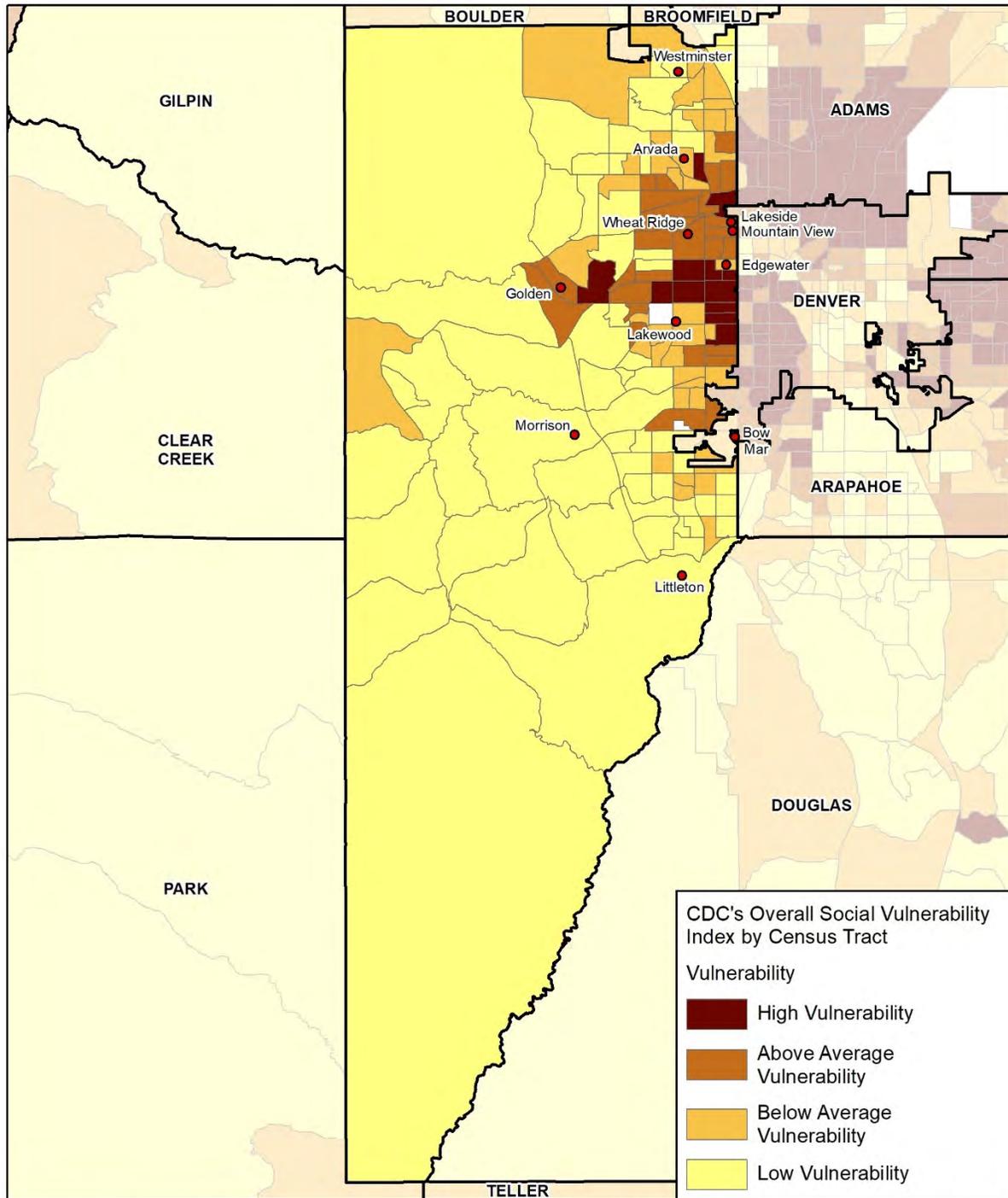
Variable	Ranking Compared to Colorado Counties	Ranking Compared to US Counties	Relative Vulnerability
No vehicle	40%	21%	Low
Group quarters	43%	35%	Below Average
Overall Social Vulnerability	24%	6%	Low

Source: CDC SoVI Data

Figure 2-3 displays the overall SoVI data for Jefferson County broken down by census tract. Figure 2-4 through Figure 2-7 breaks the data down by the four main themes described above. Most of the areas with the highest level of social vulnerability are in the northeastern portions of the County in the metro area, where the majority of the population is concentrated.

Additional information on the CDC's Social Vulnerability Index can be found at <https://svi.cdc.gov>.

Figure 2-3 Jefferson County Overall Social Vulnerability

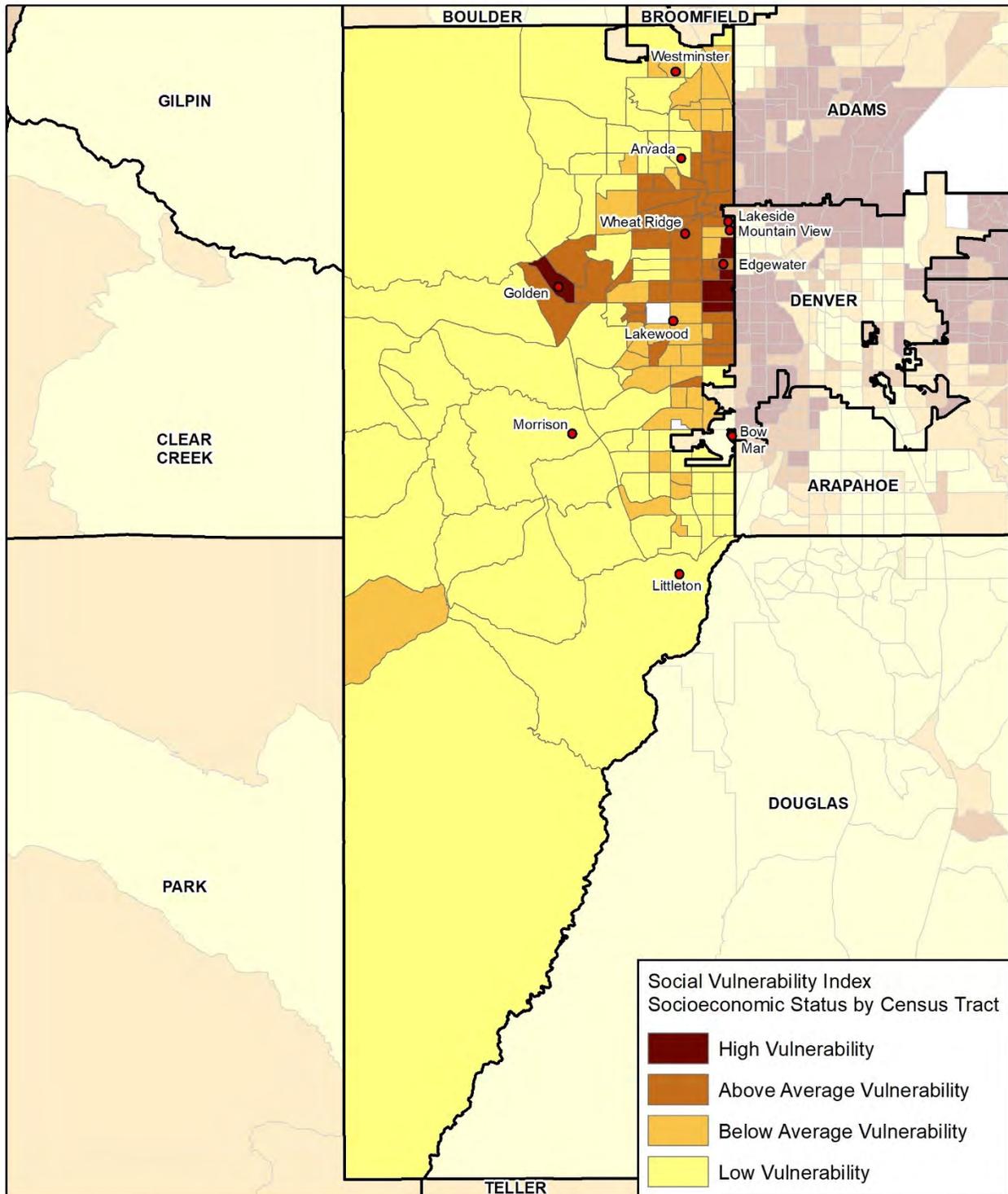


wood Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
CDC SVI 2018

0 5 10 Miles



Figure 2-4 Jefferson County Socioeconomic Vulnerability

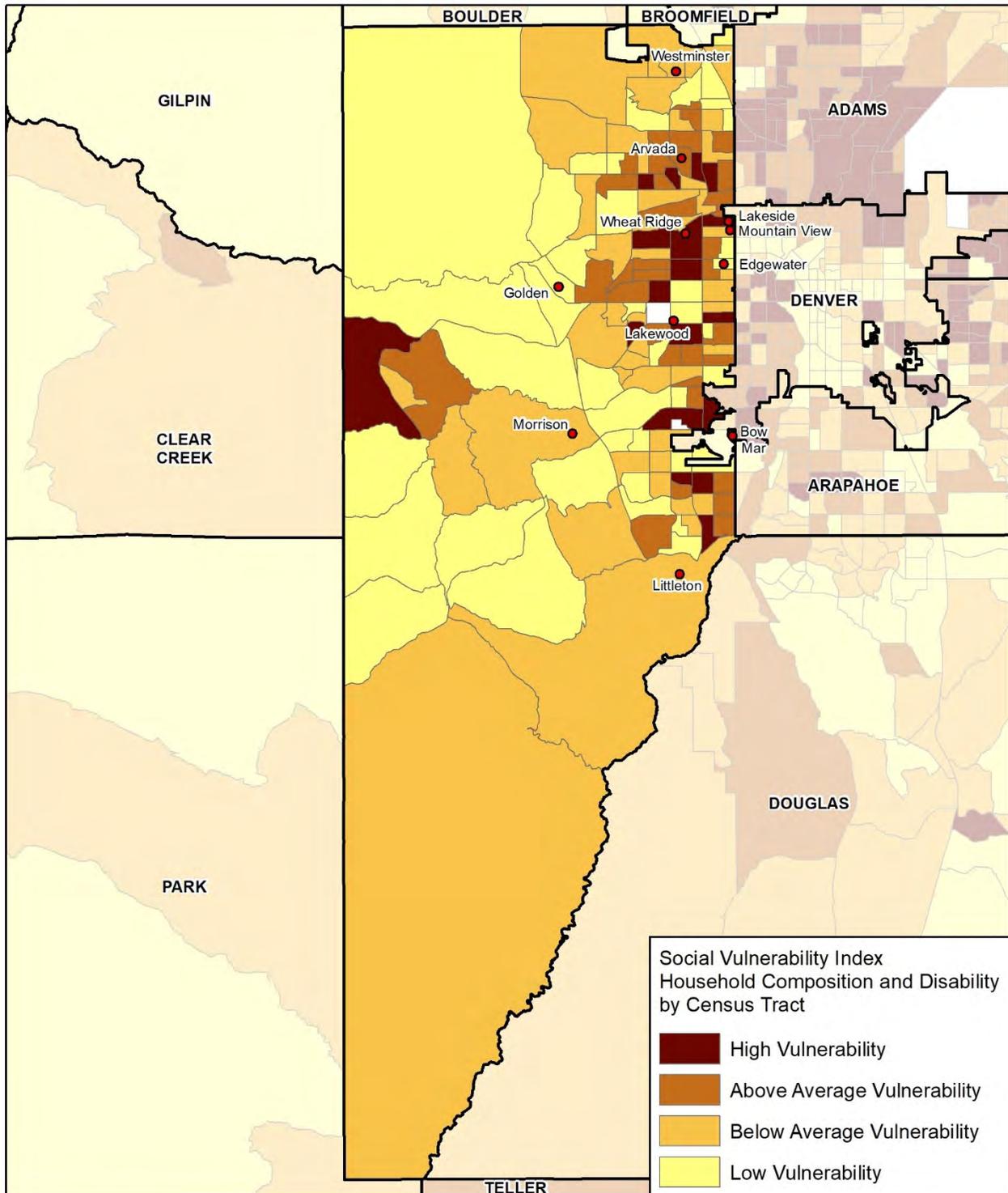


wood Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
CDC SVI 2018

0 5 10 Miles



Figure 2-5 Jefferson County Household Composition and Disability Vulnerability

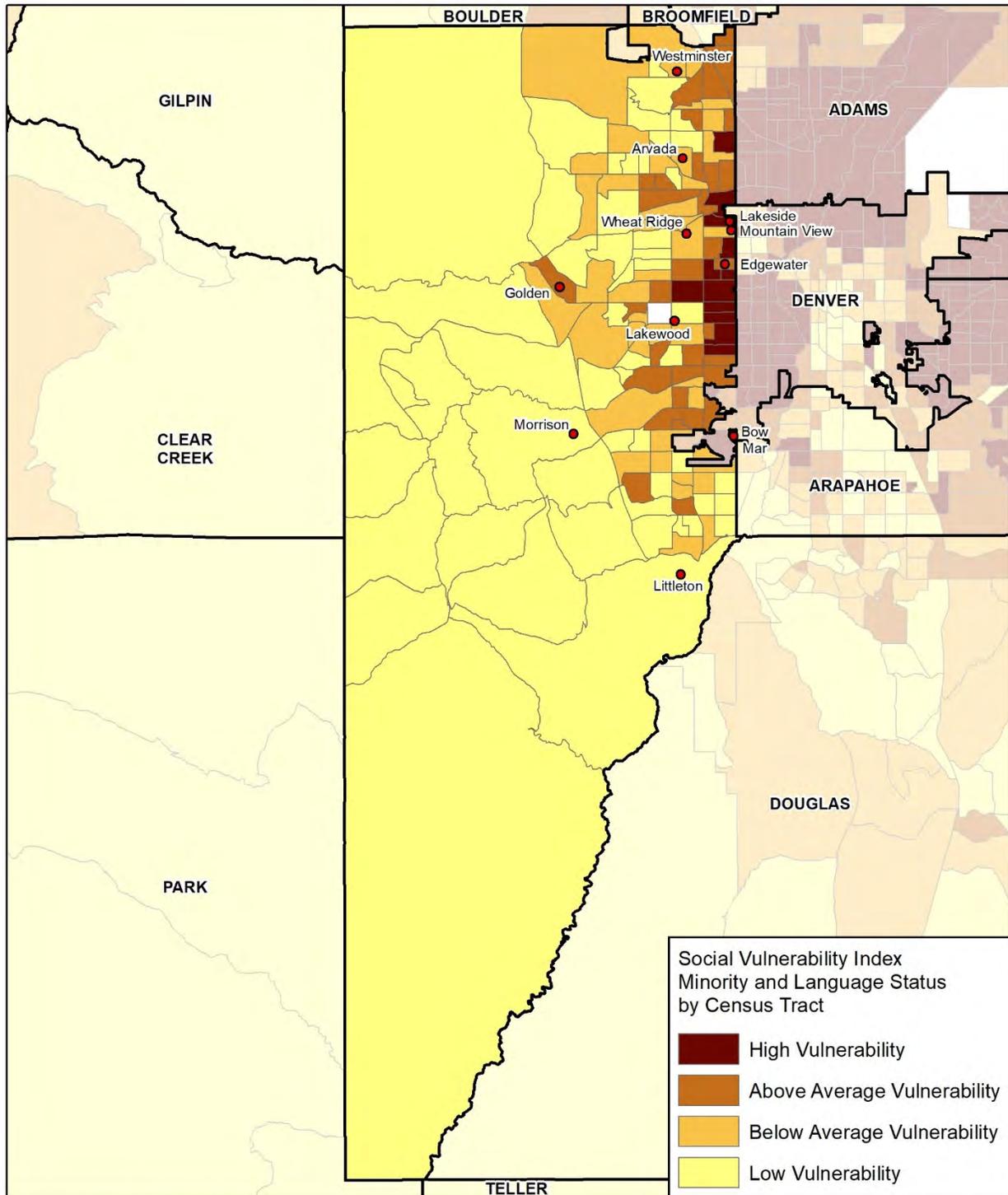


wood. Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
CDC SVI 2018

0 5 10 Miles



Figure 2-6 Jefferson County Minority Status and Language Vulnerability

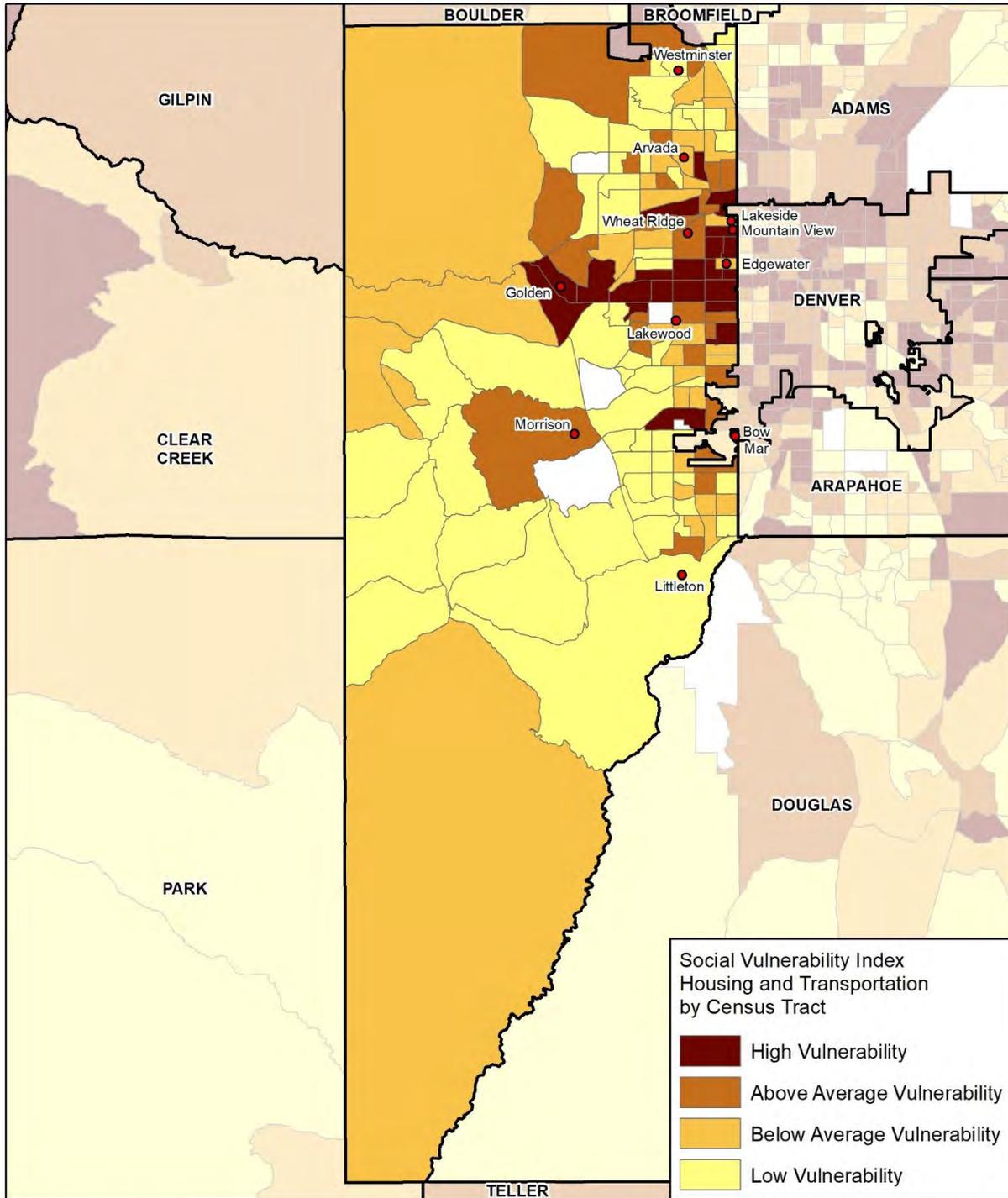


wood Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
CDC SVI 2018

0 5 10 Miles



Figure 2-7 Jefferson County Housing and Transportation Vulnerability



wood Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
CDC SVI 2018

0 5 10 Miles



2.4 History

Jefferson County has a history rich in people, events and progress. Taking the name of the third U.S. President Thomas Jefferson, the County was formally organized in 1861 by the Colorado Territorial Legislature. The need for an organized local government began in the late 1850s when droves of gold-seeking settlers came west. In 1858, when gold was discovered in the Rocky Mountains, there were fewer than 200 settlers in the area. An influx of nearly 35,000 people arrived two years later, lured by the glitter of gold. The first provisional governor of Jefferson Territory was Robert W. Steele, who lived at Mount Vernon. County offices were located in Loveland Hall until 1877 when the first Jefferson County Courthouse was built. Commissioners in 1862 were paid \$3 per day for their meetings plus mileage to the meeting hall. The City of Golden served as the capital for the Colorado Territory from 1862 to 1867.

The county tax in 1862 was 6 mills and the school tax was 2.5 mills. County taxes for that year amounted to \$1,594.61. By comparison, in 1996 Jefferson County's mill levy was 25.584 and property taxes alone exceeded \$96,000,000. In the early years, farmers and ranchers thrived by supplying food and supplies to the mining towns scattered throughout the mountains. Mining occurred along the Hogback in Idledale, on Lookout Mountain, and in Genesee. Contemporary elements within the County include a variety of industries. Some of these are aerospace engineering from companies such as Lockheed Martin, environmental engineering from Ball Corp., the Coors brewery, the Colorado School of Mines, local grocery chains, and numerous private, locally owned, or large corporate businesses. Many of these, such as the School of Mines and Coors Brewery, were established in the late 1800s and are nearly as old as the territory itself. Dinosaur Ridge, where fossils were first discovered in 1877, remains a prominent and archaeologically significant resource. Mount Olivet Cemetery, which opened in 1892 and was called "The New City of the Dead", remains one of the largest cemeteries in Colorado and is still active.

2.5 Economy

According to the Jefferson County Economic Development Corporation, as of 2020, the top employers in the county are:

- Lockheed Martin 6,200 employees
- St. Anthony Hospital 2,400 employees
- Terumo BCT 2,400 employees
- Lutheran Medical Center/SCL Health 2,300 employees
- MillerCoors Brewing 2,080 employees
- National Renewable Energy Lab 1,750 employees
- Ball Corporation 1,700 employees
- FirstBank Holding Co. of Colorado 1,480 employees
- Coorstek 1,300 employees
- HomeAdvisor 1,130 employees

Select economic characteristics for Jefferson County from the 2018-2019 American Community Survey Estimates are shown in Table 2-6. Characteristics for Jefferson County are for the entire County.

Table 2-6 Jefferson County Economic Characteristics

Characteristic	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
Individuals below poverty level (%)	7.1	5.8	9.6	15.8	9.1	3.2	12.9
Median home value (\$)	\$397,700	\$384,500	\$408,500	\$522,200	\$364,800	\$541,700	\$383,900
Median household income (\$)	\$82,986	\$84,717	56,028	\$72,349	\$66,740	\$105,536	\$57,659
Per capita income (\$)	\$44,119	\$42,921	\$33,529	\$39,184	\$38,612	\$40,900	\$33,956
Housing Occupancy Rate (%)	96.4	96.9	95.8	94.6	96.5	94.4	95.8
Unemployment rate (%)	3.6	3.8	4.8	4.6	3.5	2.1	3.7

Source: US Census American Community Survey

2.6 Land Use and Development Trends

A key strategy for reducing future losses in a community is to avoid development in known hazard areas and to enforce the development of safe structures in other areas. The purpose of this strategy is to keep people, businesses, and buildings out of harm's way before a hazard event occurs.

Countywide, there have been 8,501 new buildings constructed between 2015 and 2020. Thousands of these new structures have been constructed in areas exposed to one or more hazards. As discussed below in Section 2.7, the County and jurisdictions have land-use regulations in place that require mitigation when building in floodplains and geologic hazard areas, reducing the vulnerability of these new structures. Table 2-7 and Table 2-8 summarize this trend in greater detail.

Table 2-7 New Structures Built in Hazard Areas, 2015 to 2020

Hazard	New Structures
1% Chance Flood	21
0.2% Chance Flood	71
Local Flood Layers	9
Dam Inundation	784
Landslide	0
Rockfall	0
Slope Failure	3
Subsidence	1,392
Dipping Bedrock	1,297
Total	3,577

Source: Wood analysis based on Jefferson County Assessor's Office, Colorado Geological Survey, FEMA NFIP Floodplain data, Colorado DWR Dam Safety

Table 2-8 New Structures Built in Wildfire Zones, 2015 to 2020

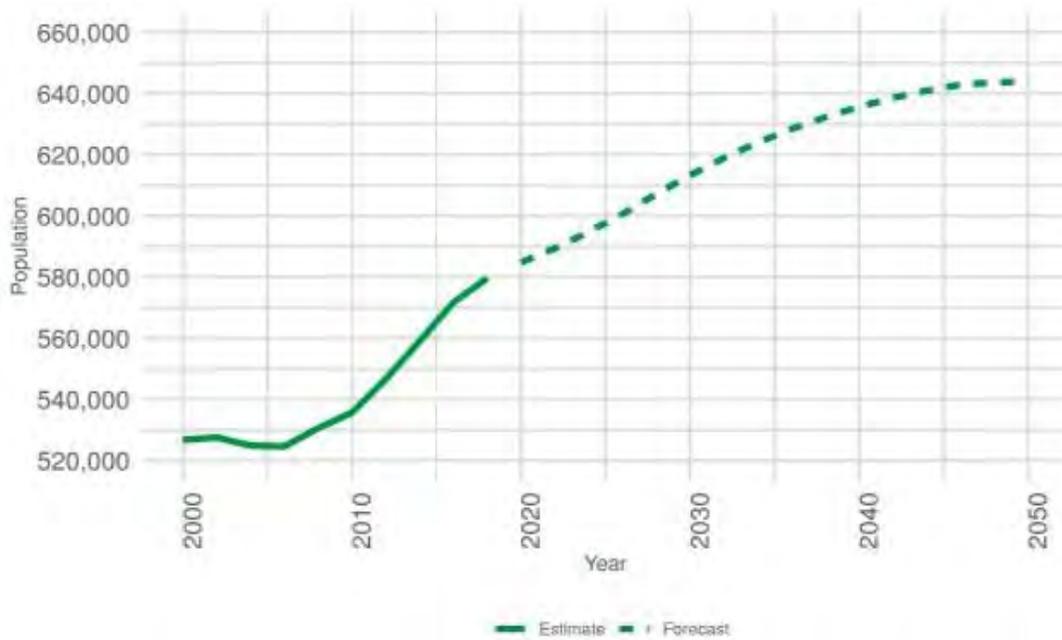
Wildfire Risk	New Structures
Lowest	2,022
Low	663
Moderate	2,948
High	589

Wildfire Risk	New Structures
Highest	15
Total	6,237

Source: Wood analysis based on Jefferson County Assessor's Office, Colorado State Forest Service

According to the Colorado State Demography Office, between 2020 and 2030 Jefferson County's population is projected to grow at an average of 0.7% a year, with the overall growth rate expected to slow to 0.27% between 2030 and 2040. The county's population is projected to be 643,945 by 2050. Figure 2-8 shows the population forecast for the next 30 years.

Figure 2-8 Jefferson County Population Forecast, 2000 to 2050



Source: Colorado State Demography Office

2.7 Capabilities Assessment

The following section assesses the County's and jurisdictions' existing capabilities to pursue hazard mitigation. The capability assessment analyzes Jefferson County's capabilities that can be leveraged to mitigate hazards. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters, and more accurately focuses the goals, objectives, and proposed actions of this plan.

The HMPC used a two-step approach to conduct this assessment for the County and jurisdictions. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken if deemed appropriate. Second, the HMPC conducted an inventory and review of existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This assessment is divided into four sections: regulatory mitigation capabilities; administrative and technical mitigation capabilities; fiscal mitigation capabilities; and mitigation outreach and partnerships. Additional information on jurisdiction capabilities can also be found in the Annexes.

2.7.1 Regulatory Mitigation Capabilities

Table 2-9 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Jefferson County. Excerpts from

applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities. Because many of these capabilities do not apply to non-municipal jurisdictions, information on their mitigation capabilities are described in their annexes.

Table 2-9 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
General or Comprehensive plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zoning ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subdivision ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Growth management ordinance	Yes	No	No	Yes	Yes	No	Yes
Floodplain ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Floodplain Management Plan	Yes	No	No	No	No	Yes	No
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Yes	No	Yes	Yes	Yes	Yes
Building code	Yes 2018	Yes 2018	Yes 2015	Yes 2018	Yes 2015	Yes 2020	Yes 2018
BCEGS Ratings (1-10, 1 being best)	4/3	4/3	No	4/4	4/3	5/5	5/4
Fire department ISO rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Erosion or sediment control program	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Storm water management program	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Site plan review requirements	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capital improvements plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economic development plan	No	Yes	Yes	Yes	Yes	Yes	Yes
Local emergency operations plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community Wildfire Protection Plan (CWPP)	Yes 2012	No	No	Yes 2007	Yes 2006*	No	No
Other special plans	Yes	Yes	No	Yes	Yes	No	Yes
National Flood Insurance Program	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community Rating System	Yes: 5	Yes: 5	No	Yes: 7	Yes: 6	Yes: 8	Yes: 5
Flood insurance study or other engineering study for streams	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Elevation certificates (for floodplain development)	Yes	Yes	No	Yes	Yes	Yes	Yes

Regulatory Tool (ordinances, codes, plans)	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
Other							

Source: HMPC. * Covered under West Metro Fire CWPP

Jefferson County Comprehensive Master Plan

Jefferson County adopted its first Comprehensive Master Plan in 1961, with the most recent update completed in 2017 and another plan update currently ongoing. Since then, master planning in Jefferson County has taken many different approaches, but all of the approaches have recognized that good planning involves evaluating a multitude of different factors when making land use decisions, such as transportation, geologic hazards and compatibility. The Land Use chapter of the Development Review section (Page 18) includes: guidelines for all development, infill and redevelopment, business and industry, housing, mixed-use, community uses, livestock, renewable and alternative energy, extractive resources, solid wastes and hazardous materials, activity centers, and site design. The Development Review section also addresses physical constraints. Physical constraints are those physical features that due to safety or cost concerns may potentially restrict where and how development occurs. For purposes of this Plan, physical constraints include geologic hazards and constraints, floodplains, wetlands, wildfire, radiation, landfills, abandoned mines, and wildlife. The overall vision projects a balance of residential, commercial, community, recreational, agricultural and open land uses, which protects and maintains the quality of the mountain and plains environment, provides economic vitality for current and future generations, respects private property rights, and maintains Jefferson County as a place of choice to live, work, and recreate.

This balance protects and maintains the quality of the mountain and plains environment, provides economic vitality for current and future generations, and maintains Jefferson County as a place of choice to live, work, and recreate. The plan identifies that location, availability and the convenience of goods and services is an important element in the quality of life, and that a balance of such key services as an educated workforce, schools, commercial services, and recreational and employment opportunities are vital. Well-planned retail and service levels provide a source of community identity. The roads, rivers, and trails that connect homes, offices, stores, schools, and parks are the conduits for social interaction that knit together a community. Ensuring that residential areas are balanced by commercial and service centers can contribute to an orderly pattern of development and sense of place.

The general land use management goal is to encourage diversity of residential, commercial, community, recreational, and open land uses. The plan identifies Urban and Non-Urban Interface development with an objective to accommodate higher intensity uses in areas with adequate infrastructure and minimal hazards and provide decreasing land use intensity where constraints exist and as distance to services increases. There are policies that protect important wildlife habitats and avoid development or mitigate impacts in severe wildfire areas, such as steep forested canyons and slopes greater than 30%. The plan includes provisions for infill and redevelopment, which supports adaptive reuse of historical and outdated buildings; and future growth, which complements the existing community character with efforts to accommodate anticipated growth in the Denver metro area over the next 30 years. The policy states that the County should incorporate land planning techniques that manage resources effectively.

In addition, the Comprehensive Master Plan includes goals and policies oriented towards several long-range planning issues to guide the County’s future growth and development. One such issue is environmental stewardship. This section integrates hazard mitigation with the goal to “protect people and property from hazardous conditions and events”, which includes specific policies intended to mitigate the impacts of geologic hazards, flood, wildfire, and hazardous materials. Other goals and policies seek to support water conservation measures which supports mitigation of drought risk, such as the goal to “promote the education of residents, businesses, and appropriate agencies about water issues affecting the County”.

The Water Quality policy implements State law (CRS 30-28-133(3)) which requires that local governments “shall not approve an application for a development permit unless...the applicant has satisfactorily demonstrated that the proposed water supply will be adequate.”

The ongoing update to the comp plan will further these efforts by specifically including water usage policies based on input from the public in 2019.

Building Codes

The Jefferson County Building Department enforces building codes in Jefferson County. Listed below are the codes effective January 2019.

- 2018 International Building Code
- 2018 International Residential Code
- 2018 International Fuel Gas Code
- 2018 International Mechanical Code
- 2018 International Plumbing Code
- 2018 International Existing Building Code
- 2018 International Energy Conservation Code
- 2020 National Electrical Code

In addition, the County has adopted an addendum to the 2018 Jefferson County Code Supplement - Appendix Z - Special Building Construction Regulations in Wildfire Zone 1 - Effective Date January 1, 2020. All adopted building codes can be accessed at <https://www.jeffco.us/2055/Adopted-Building-Codes>. Local fire districts have individual authority to enforce fire code standards beyond the County’s requirements.

Climatic and Geographic Design Criteria: The updated Climatic and Geographic Design Criteria for 2018 includes building standards for wind design (including wind speeds, special wind regions, and wind-borne debris), snow load, seismic design, temperature extremes, and flood hazards. The code contains provisions for additional criteria to be established by the local jurisdiction.

Wildfire: Jefferson County has two wildfire hazard overlay zones that have mitigation requirements for construction. The wildfire hazard overlay zones line generally follow what is called the “mountain front.” The State Forest Service concurs that this line indicates the predominant change from plain to mountain topography. The canyons are within wildfire zone 1 because of the chimney-effect of the terrain. The location of the wildfire zone line recognizes vegetation, slope, fire department accessibility, water supply, response time and infrastructure.

R901.1.1.1 Buildings located in more than one Wildfire Zone: A building or structure which is located partly in one Wildfire Zone and partly in another shall be considered to be in the Wildfire Zone in which more than one-half of its total floor area is located.

R901.1.1.2 Moved buildings: Any building or structure moved within or into any Wildfire Zone shall be made to comply with all the requirements for new buildings in that Wildfire Zone.

R901.1.2.1 General: Buildings hereafter erected, constructed, enlarged, altered, repaired or moved into Wildfire Zone 1 shall comply with the following: 2015 IRC Supplement Jefferson County, Colorado Page 20 of 35

R901.1.3.2 Roof coverings, material Zone 2: Except where this code requires greater protection, roof coverings for new buildings, structures or additions, roof coverings utilized for re-roofing shall be Class A, Class B or Class C, or any other roof covering permitted by this code.

Community Wildfire Protection Plans (CWPPs)

In addition to the building codes and wildfire zones, the County has a number of Community Wildfire Protection Plans (CWPPs) that assess wildfire risk and provide specific recommendations for mitigation based on scientifically sound wildfire management principles. In general, these plans are consistent with the National Fire Plan (2000) and the Healthy Forests Restoration Act (2003) both of which are federal level frameworks for wildfire hazard evaluation and strategic planning. There are several plans which are undergoing an update as of the drafting of this plan.

The following jurisdictions and communities in Jefferson County have CWPPs in place:

- Jefferson County CWPP, ALL (2012)
- City of Golden CWPP (2007)
- Coal Creek Canyon Fire Protection District CWPP (2008)
- Elk Creek Fire Protection District CWPP (2005)
- Evergreen Fire Protection District CWPP (2020)
- Fairmount Fire Protection District CWPP (2007)
- Foothills Fire Protection District CWPP (2020)
- Genesee Fire Protection District CWPP (2008)
- Golden Gate Fire Protection District CWPP (2011)
- Indian Hills Fire Protection District CWPP (2007)
- Inter-Canyon Fire Protection District CWPP (2007)
- Lower North Fork CWPP (2007)
- North Fork Fire Protection District CWPP (2011)
- South Platte CWPP (2007)
- West Metro Fire Protection District CWPP (2006)

Slash Collection Program

Slash is debris, from nature, such as tree limbs, pruning's and pine needles. If not removed, slash can add to potential fire hazards. Wildfires have become more common in Jefferson County and clearing this debris can prevent fire damage to structures and spread of wildfire. In 2015, the County expanded its slash collection program which helps homeowners to mitigate fire risk by collecting and removing loads of slash at predetermined collection sites around the County. The cost to drop off a single truckload is \$20 (2015) and is used to partially cover the administrative costs of the program. Locations and dates of collection sites are updated and posted at: <https://www.jeffco.us/2493/Slash-Collection>

Foundations and Soils Investigation

The Designated Dipping Bedrock Area is determined by the Planning and Zoning Department. The building codes identify specific pier length, as well as diameter and support penetration for building in dipping bedrock areas. The codes also identify specifications for foundation walls and structural basement floors.

Flood Loads

Planning and Zoning Department approval required pursuant to other County regulations.

Floodplain Management

In accordance with the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973, Jefferson County has applied and subsequently qualified for participation in the National Flood Insurance Program. Jefferson County joined the NFIP on August 5, 1986 and the Community Rating System (CRS) on October 1, 2005. Detailed information on the Jefferson County and its communities' participation in CRS can be found below in Section 2.7.4.

The County requires developments that impact floodplains to comply with the floodplain regulations of the Zoning Resolution and Regulation. Although in many circumstances it may be desirable to leave the floodplain in its natural state, it is evident that development in areas encumbered by floodplains often results in alterations within the floodplain limits. The County has adopted floodplain regulations as part of its Zoning Resolution and Regulation. These regulations should be referenced when alterations within floodplains are proposed.

Stormwater Management

Jefferson County is responsible for the stormwater quality that drains from property into the storm sewer system and discharges to state waters. As part of the Stormwater Phase II Regulations, Jefferson County must apply to the State of Colorado Department of Public Health and Environment for a Municipal Separate Storm Sewer System (MS4) Permit. The five-year permit was first granted to Jefferson County in March 2003. Under this permit, Jefferson County is mandated to improve the quality of stormwater.

Jefferson County has created stormwater management regulations. These regulations together with all future amendments are known as the “Jefferson County Storm Drainage Design and Technical Criteria” adopted March 24th, 2009 and referenced in the Jefferson County Land Development Regulation. The criteria apply to all lands within the unincorporated areas of the County, including all public lands. A revision to this document was published on December 17, 2019. Policies and technical criteria not specifically addressed in these criteria will follow the provisions of the Mile High Flood District “Urban Storm Drainage Criteria Manual.”

Stormwater runoff is a by-product of urbanization. Drainage planning is required for all new developments. These plans define major drainage facilities, including those that are required public improvements for new developments. Drainage reports and plans, construction drawings, specifications, and as-built information will be submitted and approved as required by the Regulation and Building Permit Procedure. AutoCAD example drawings are available from the County at:

<https://www.jeffco.us/2629/Storm-Drainage-Design-Technical-Criteria>

For drainage basins less than five square miles, a two-hour storm distribution without area adjustment of the point rainfall values will be used for the Colorado Urban Hydrograph Profile. For drainage basins between five and ten square miles, a two-hour storm distribution is used but the incremental rainfall values are adjusted for the large basin area in accordance with suggested procedures in the NOAA Atlas for Colorado.

Wildfire Hazard Overlay District Zoning Resolution – Section 39 of Jefferson County Zoning Resolution (2020)

This District is intended to promote the public health, safety and welfare of the citizens of Jefferson County, minimize the risk of loss of life and property in Wildfire Hazard Overlay Zone District; encourage and regulate prudent land use in the Wildfire Hazard Overlay Zone District so as not to increase the danger to the public health, safety and property; reduce the demands for public expenditures for relief and protection of structures and facilities permitted in the Wildfire Hazard Overlay Zone District; regulate buildings and structures so as to minimize the hazard to public health, safety, welfare, and to public or private property.

No building permit may be issued for a new dwelling, the replacement of an existing dwelling, or for additional space of 400 square feet or more (cumulatively measured) from May 21, 2002, the date of this regulation’s adoption, until written evidence has been submitted and approved by the Zoning Administrator or his/her appointed designee stating that the following have been satisfied:

- Defensible space and associated fuel break thinning’s have been created around the dwelling, or a wildfire mitigation site plan has been reviewed and a special exception granted by the Board of Adjustment for the property for which a building permit has been requested.
- Access standards as specified in the General Provisions and Regulations section of the Zoning Resolution have been satisfied.

Grading, Erosion, and Sediment Control Regulation – Section 17 of the Jefferson County Land Development Regulation

Grading, erosion, and sediment control plans shall be submitted as required by the Submittal Requirements Section in accordance with the following standards.

- The existing and final contours shall be shown at 2-foot intervals for subdivisions within the plains area and contours at 5-foot intervals for subdivisions within the mountain areas including the method utilized to obtain all contour intervals. Contours shall be accurate to within 0.5 contour. Elevations shall be based on USGS sea level datum. The USGS quad maps shall not be accepted as evidence for topographic contours.
- Grading, erosion and sediment control plans shall be prepared in accordance with and in compliance with the standards in the Land Disturbance Section of the Zoning Resolution.
- Grading, erosion and sediment control plans must include the following:
 - Plans for all private and public streets/roads in accordance with the Roadway Design and Construction Manual and the Circulation Section.

- Conceptual driveway plans if existing slopes exceed 30%.
 - Overlot grading plans for all non-residential, multi-family, manufactured home developments, and single-family residential developments with lot sizes under ½ acre. Overlot grading plans are not required for single-family residential lots over ½ acre in size if the developer is not proposing Overlot grading, grading is not required and/or shown on the drainage plan, and the slopes in the buildable areas do not exceed 30%. Overlot grading plans must be consistent with the grading and basin boundaries shown on the drainage plan.
 - Plans for all drainage improvements including but not limited to detention/ water quality facilities, drainage channels, storm sewer, and outlet protection.
 - Grading, erosion and sediment control plans for each lot in residential developments with lot sizes under ½ acre shall be prepared in accordance with and in compliance with the Notice of Intent standards in the Land Disturbance Section of the Zoning Resolution.
- Approvals: The Planning and Zoning Division shall approve the plans prior to development approval. The Jefferson Conservation District shall approve the seed mix and mulching rates.

The intent of these specifications is to ensure excavation and grading occur according to the approved plan and to establish minimum materials, methods, and standards to be used in the construction of site grading fills for support of residences and other structures, embankments or excavations for streets, roads, drainage channels, structures, or other purposes. The work covered by these specifications includes excavation, embankment, grading, compaction, clearing and grubbing, removal of topsoil, trees, stumps, vegetation, removal and/or resetting of minor obstructions, and any other work incidental to the construction of site grading fills.

Geologic and Geotechnical Regulations – Section 25 of the Jefferson County Land Development Regulation

The geologic and geotechnical standards were adopted to protect lots, tracts, and structures from geologic hazards, including, but not limited to, dipping bedrock, rockfall, potentially unstable slopes, swelling soils, and subsidence. Buildable areas within lots, tracts, and areas designated for streets/roads and drainage improvements shall be:

- Reasonably free from geologic hazards or adequately mitigated from geologic hazards.
- Free of adverse soil conditions, constructed away from adverse soil conditions, or constructed in areas where adverse soil conditions have been abated.
- All areas which fall within the Dipping Bedrock Overlay District shall be subject to the restrictions in the Dipping Bedrock Overlay District of the Jefferson County Zoning Resolution.

Detailed grading plans shall be submitted which show overburden soil or fill at least ten (10) feet thick beneath the anticipated level of the bottom of the structure foundation(s) and the top of bedrock. If deep (pier) foundations are proposed, the Zoning Administrator may require a review of such plans by the Engineering Advisory Board.

Or: If ten (10) feet of overburden or fill are not proposed, detailed engineering plans shall be submitted to the Engineering Advisory Board. The alternate mitigation plans shall contain the information necessary to determine that potential hazards can be adequately mitigated by other methods.

Land Disturbance Regulation – Section 16 of the Jefferson County Zoning Resolution

The purpose of the Land Disturbance Section is to:

- Enhance the quality of water in the County’s drainage ways and surface waters;
- Protect life, property, and the environment from loss, injury, and damage by stormwater runoff, erosion, sediment transport, ponding, flooding, landslides, accelerated soil creep, settlement and subsidence, excessive dust, and other potential hazards caused by grading, construction activities, and denuded soils;
- Allow a temporary land use for land disturbance activities; and
- Establish performance standards to:
 - Define grading, drainage, erosion and sediment control, and waste disposal requirements;
 - Ensure mitigation of adverse impacts; and (orig. 10-12-04)

- Ensure the reclamation of disturbed land. (orig. 10-12-04)

All land disturbance activities must conform to the performance standards as detailed in this Section. These standards apply whether or not a grading permit or Notice of Intent is required.

It shall be unlawful for any person, firm or corporation to do or authorize any land disturbance in the unincorporated area of Jefferson County without first obtaining a grading permit from the County or submitting a Notice of Intent to the County to authorize temporary land disturbance activities unless specifically exempted by this section. The applicant, the landowner, and the contractor are responsible if a land disturbance activity is undertaken in contravention of the performance standards, or if a land disturbance activity is undertaken beyond the scope of the grading permit or Notice of Intent without County approval. Land disturbance activities must be completed in compliance with the approved plans.

Roadway Design and Construction Regulations

Jefferson County has adopted a Major Thoroughfare Plan based on traffic volumes, existing land use and anticipated growth. The Major Thoroughfare Plan designates streets/roads as freeway, parkway, arterial (principal and minor), or collector.

Jefferson County has also adopted a Roadway Design and Construction Manual (2009) that provides geometric standards for construction, reconstruction and rehabilitation of roadway and transportation facilities. The County also supplies AutoCAD format drawings for template examples on the County website.

2.7.2 Administrative/Technical Mitigation Capabilities

Table 2-10 identifies the County personnel responsible for activities related to mitigation and loss prevention in Jefferson County.

Table 2-10 Administrative and Technical Mitigation Capabilities

Personnel Resources	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
Planner/engineer with knowledge of land development/land management practices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Planner/engineer/scientist with an understanding of natural hazards	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Resiliency Planner	No	Yes	No	No	Yes	Yes	No
Transportation Planner	Yes	Yes	Yes	No	Yes	Yes	Yes
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Personnel skilled in GIS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full time building official	Yes	Yes	Yes	Yes	Yes	No	Yes
Floodplain manager	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Emergency manager	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grant writer	Yes	Yes	No	No	Yes	Yes	No

	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
Personnel Resources							
Other personnel	Yes	Yes	No	Yes	No	Yes	Yes
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mass/Emergency Notification Systems (Reverse 9-11, etc.)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other	Sustainability Coordinator, Operations Coordinator (assigned to emergency ops, stormwater, debris management) & Forester (Forest health and fuel mitigation)			Homeless Navigator – Homeless liaison to mitigate and facilitate impacts to the homeless population		Town Clerk	Parks & Recreation and Public Works Staff

Source: HMPC

2.7.3 Fiscal Mitigation Capabilities

Table 2-11 identifies financial tools or resources that the County and municipalities have used in the past to fund mitigation activities, and highlights resources that may not have been used but are available for future use.

Table 2-11 Financial Capabilities That Have Been Used to Fund Mitigation Activities

	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
Financial Resources							
Community Development Block Grants	Yes	Yes	No, but available	No, but available	No, but available	Yes	Yes
Capital improvements project funding	Yes	Yes	Yes	No, but available	No, but available	Yes	Yes
Authority to levy taxes for specific purposes	Yes	No	No, but available	No, but available	No, but available	Yes	Yes
Fees for water, sewer, gas, or electric services	No	Yes	Yes	No, but available	No, but available	Yes	No
Stormwater Service Fees	No	Yes	No	Yes	Yes	No	No
Impact fees for new development	Yes	Yes	No	No, but available	No	Yes	Yes

	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
Financial Resources							
Incur debt through general obligation bonds	Yes	No	No, but available	No, but available	No, but available	Yes	Yes
Incur debt through special tax bonds	Yes	No	No, but available	No, but available	No	Yes	Yes
Incur debt through private activities	No	Yes	No	No, but available	No	Yes	Yes
Withhold spending in hazard prone areas	No	No	No	No, but available	No	Yes	No

Source: HMPC

2.7.4 Other Mitigation Efforts

Public Education and Outreach

Successful sustained mitigation depends upon robust collaboration between the public and private sector, different levels of government, municipal jurisdictions, departments, agencies, and community groups within Jefferson County. The participating jurisdictions have several active public education programs to educate the public about hazards and actions they can take to mitigate against those hazards, as shown in

Table 2-12 Education & Outreach Capabilities

	Jefferson County	Arvada	Edgewater	Golden	Lakewood	Morrison	Wheat Ridge
Education & Outreach Capabilities							
Local Citizen Groups That Communicate Hazard Risk	Yes	Yes	No	Yes	Yes	Yes	No
Firewise	Yes	No	No	Yes	No	No	No
StormReady	Yes	Yes	No	Yes	Yes	No	No
Other?		Yes ^{1,2}			Yes ²	Yes ³	No

Notes: 1- Ready, Set, Go! Program; 2 –Community Emergency Response Team (CERT); 3 – Annual Public Works pick up slash and limbs for residents free of charge, Annual Town Clean-Up Day where access to dumpsters is provided to residents free of charge for the disposal of any/all trash including tree limbs, etc.

Wildland Risk Reduction Task Force

To ensure a thoughtful, collaborative approach to addressing the risk of wildfires in Jefferson County, in November 2019 the Board of County Commissioners established the Jefferson County Wildfire Risk Reduction Task Force. Members represent community leaders, fire rescue districts, county government, law enforcement, business, forestry, water districts, and others – as well as geographic diversity. After in-depth discussion and a prioritization process, task force members identified three goals:

- Mitigation
- Community education (to raise awareness about mitigation)
- Revenue streams (to fund more mitigation)

Other issues such as fire suppression, evacuation routes and emergency notification also were raised.

The Task Force’s recommendations report *Working Together to Reduce the Risk of Wildfire in Jefferson County* released on November 10, 2020, opens by noting that “Investment upfront in mitigation and community education can save lives, property and firefighting costs later.” The Task Force Mitigation Team identified defensible space and forest management as key mitigation activities, and made a number of recommendations. Implementing these recommendations has been adopted as Objective 3g, and several recommendations been incorporated into the Mitigation Action Plan in Section 5.4.

National Flood Insurance Program (NFIP) and the Community Rating System (CRS)

Jefferson County has been mapped for flood hazards and participates in the National Flood Insurance Program (NFIP). Details of local jurisdiction participation status, policy and claims data from the NFIP’s Community Information System (CIS) are shown in Table 2-13.

Table 2-13 Communities Participating in the FEMA NFIP

CID	Community	Initial FIRM Identified	Current Effective Map Date	Policies in Force	Total Coverage	# of Claims Paid	Total Losses Paid
080087	Jefferson County	08/05/1986	01/15/2021	409	\$111,193,700	138	\$1,407,173
085072	City of Arvada	07/01/1974	01/15/2021	359	\$95,813,400	71	\$66,412
080089	City of Edgewater	08/15/1989	02/05/2014	32	\$8,709,500	27	\$51,637
080090	City of Golden	05/18/1985	12/20/2019	88	\$25,874,000	14	\$48,938
085075	City of Lakewood	12/31/1974	02/05/2014	344	\$104,242,800	157	\$649,523
080092	Town of Morrison	12/01/1982	02/05/2014	7	\$2,481,300	2	\$1,232
085079	City of Wheat Ridge	05/26/1972	02/05/2014	219	\$54,870,100	45	\$97,251
Total				1,458	\$403,184,800	454	\$1,022,166

Source: FEMA, Current as of April 1, 2021

In addition to participating in the NFIP, Jefferson County, the Cities of Arvada, Golden, Lakewood, and Wheat Ridge, and the Town of Morrison all participate in the Community Rating System (CRS). CRS is a voluntary program for NFIP participating communities focused on reducing flood damages to insurable property and encouraging a comprehensive approach to floodplain management. The CRS provides incentives in the form of insurance premium discounts to communities that go above and beyond the minimum floodplain management requirements and develop extra measures to reduce flood risk. There are 10 CRS classes, and the classification determines the insurance premium discount for policyholders, as shown in Table 2-14.

Table 2-14 CRS Premium Discounts

Class	Discount	Class	Discount	SFHA (Zones A, AE, A1-A30, V, V1-V30, AO, and AH): Discount varies depending on class. SHFA (Zones A99, AR/A, AR/AE, AR/A1-A30, AR/AH, and AR/AO): 10% discount for Classes 1-6; 5% discount for Classes 7-9. Non-SFHA (Zones B, C, X, D): 10% discount for Classes 1-6; 5% discount for Classes 7-9. In determining CRS premium discount, all AR and A99 Zones are treated as non-SFHAs.
1	45%	6	20%	
2	40%	7	15%	
3	35%	8	10%	
4	30%	9	5%	
5	25%	10	--	

Source: FEMA CRS Coordinators Manual

All CRS participating communities start out with a Class 10 rating (which provides no premium discount). Class 1 requires the most credit points and offers the largest premium discount. Within the CRS program,

there are 18 activities recognized as measures for eliminating local exposure to flooding. Credit points are assigned to each activity, which have been organized under four main categories:

- Public Information
- Mapping and Regulation
- Flood Damage Reduction
- Flood Preparedness

The participating communities and their relative CRS classes and discounts are summarized in Table 2-15 below. Since 2010, the County has made significant progress in implementing flood capabilities, which is reflected in the updated Community Rating System (CRS) classification. Unincorporated Jefferson County went from CRS 9 to 6 in 2014, a 3 class increase which results in a 20% discount (previously 5%) for flood insurance policies in SFHA, and 10% premium reduction (previously 5%) for non-SFHA policies.

Table 2-15 Current CRS Participation and Summary Information

Community	Current Rating	Policies	Total Premiums	Discount	Current Annual Saving
Jefferson County	5	409	\$373,384	25%	\$82,904
Arvada	5	359	\$491,302	25%	\$138,434
Wheat Ridge	5	219	\$237,721	25%	\$62,731
Lakewood	6	344	\$339,271	20%	\$57,588
Golden	7	88	\$90,692	15%	\$12,041
Morrison	8	7	\$61,036	10%	\$6,782

Source: FEMA CRS

Code RED

Jefferson County participates in the Code RED emergency communications network which is a service that places calls, texts and/or emails to subscribers within the direct path of the storm in the event of a severe weather alert from the National Weather Service. Notifications are sent in an effort to provide residents extra time to prepare that could save lives. Types of alerts include tornado warnings, severe thunderstorm warnings, flash flood warnings, tsunami warnings and winter storm warnings.

2.7.5 Opportunities for Enhancement

Based on the capability assessment, Jefferson County has several existing mechanisms in place that already help to mitigate hazards, including numerous planning tools and many available funding mechanisms. The tables above show a consistently high level of capabilities across the County and participating jurisdictions, to include adoption of building codes, floodplain regulations, and CRS participation.

There are also opportunities for the County to expand or improve on its capability to further protect the community. Opportunities include the continuation of incorporating updated risk information into updates of the County’s Comprehensive Plan and other regulatory documents. As well as ensuring risk information is taken into consideration in the Land Use Code updates and during the development review process. Jefferson County has a very active Local Emergency Planning Committee (LEPC), which can help coordinate mitigation goals and programs.

The HMPC recognizes that lack of implementation of the 2016 Plan over the past five years has limited the effectiveness of a sustained mitigation program. The County and jurisdictions have committed to improving this going forward, as described in Section 6.

An additional opportunity for capability enhancement includes leveraging ongoing recovery efforts to implement a focus on working with impacted community members to further identify ways to create equitable processes and policies for disaster management and decrease barriers to resources for marginalized and underserved communities that are traditionally disproportionately affected by a crisis.

Another opportunity being considered to reduce flood losses is for jurisdictions within Jefferson County that participate in the Community Rating System (CRS) to work towards increasing their rating. As discussed in Table 2-13, there are already several jurisdictions, including Jefferson County, who are participants in the CRS program. For each jurisdiction, the annual savings to their flood insurance policyholders is shown in Table 2-15 above.

Table 2-16 shows the potential annual savings to policyholders for each CRS Rating, along with the current ratings and savings for comparison. Improving a communities standing in the CRS program must be based on balancing those benefits against the staff time and jurisdictional commitments required to achieve and maintain certification, however, as summarized below the potential savings for each community could be in the tens of thousands of dollars.

Table 2-16 Potential Benefits of CRS Ratings By Jurisdiction

Community	Class 9 Annual Savings	Class 8 Annual Savings	Class 7 Annual Savings	Class 6 Annual Savings	Class 5 Annual Savings	Class 4 Annual Savings	Class 3 Annual Savings	Class 2 Annual Savings	Class 1 Annual Savings
Jefferson County	\$18,096	\$33,667	\$49,237	\$67,333	\$82,904*	\$98,475	\$114,046	\$129,617	\$145,187
Arvada	\$28,706	\$55,713	\$82,720	\$111,427	\$138,434*	\$165,441	\$192,448	\$219,455	\$246,462
Edgewater	\$2,589	\$4,927	\$7,264	\$9,853	\$12,190	\$14,528	\$16,865	\$19,202	\$21,539
Golden	\$4,505	\$8,273*	\$12,041	\$16,546	\$20,314	\$24,082	\$27,850	\$31,617	\$35,385
Lakewood	\$15,200	\$28,794	\$42,388	\$57,588*	\$71,182	\$84,776	\$98,369	\$111,963	\$125,557
Morrison	\$3,391	\$6,782*	\$10,173	\$13,564	\$16,954	\$20,345	\$23,736	\$27,127	\$30,518
Wheat Ridge	\$13,986	\$25,572	\$37,159	\$51,145	\$62,731*	\$74,318	\$85,904	\$97,491	\$109,077

Source: FEMA, as of 4/19/2021; * indicates current savings based on 2020 CRS status.

3 Planning Process

Requirements §201.6(b) and §201.6(c)(1) of the 2000 Disaster Mitigation Act (DMA): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- 1) *An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- 2) *An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and*
- 3) *Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

The plan shall document the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

3.1 Background on Mitigation Planning in Jefferson County

The primary purpose of the Jefferson County Hazard Mitigation Plan (HMP) update is to reduce or eliminate long-term risk to people and property from natural and human-caused hazards and their effects on the Jefferson County planning area. Recognizing the importance of hazard mitigation planning, Jefferson County and the cities of Arvada, Lakewood and Wheat Ridge participated in the 2003 Denver Regional Council of Governments (DRCOG). In order to develop a more specific risk assessment, goals, and mitigation projects, the County and the jurisdictions noted previously, developed their own Jefferson County specific multi-jurisdictional plan in 2009-2010 with an additional ten jurisdictions participating in the planning process. In 2015-2016 the plan underwent a comprehensive five-year update as required by the DMA.

The Hazard Mitigation Plan (HMP) underwent a comprehensive update in 2021. The planning process followed during the update was similar to what was used in the original plan development. This planning process utilized the input from a multi-jurisdictional Hazard Mitigation Planning Committee (HMPC). A consultant, Wood Environment & Infrastructure Solutions, Inc (Wood) was hired to assist with the update in 2021. The plan update process is described further in this section and documented in Appendix C.

Jefferson County and its communities has been an integral constituent in nurturing partnerships across boundaries for decades. This proactive approach established the County as a leader to the Front Range communities for hazard mitigation and overall emergency management program planning. This plan builds from the accumulated efforts of previous planning mechanisms that clearly align with the planning regulations set forth by the Disaster Mitigation Act of 2000 (DMA).

3.2 What's New in the Plan Update

Requirements §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.

This HMP update involved a comprehensive review and update of each section of the 2016 plan and includes an assessment of the progress of the participating communities in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan. Only the information and data still valid from the previous plan was carried forward as applicable into this HMP update.

One significant change to the 2021 plan update process was the inclusion of five new participating jurisdictions, each listed below under Section 3.3 Local Government Participation. Three jurisdictions (Lakeside, Mountain View, and Pleasant View Metropolitan District) that participated in 2016 chose not to participate in the 2021 plan update due to other priorities and limited resources.

Wood developed a summary of each section in the plan and guided the HMPC through the elements that needed updating during the kickoff meeting in December 2020. This included analyzing each section using FEMA’s local plan update guidance (2013) as well as guidance from the National Flood Insurance (NFIP) Community Rating System (CRS), to ensure that the plan met the latest requirements. The HMPC and Wood determined that nearly every section of the plan would need revision to align the plan with the latest FEMA planning guidance and requirements. A summary of the changes in this plan update is highlighted in the table below.

Table 3-1 Jefferson County Hazard Mitigation Plan Update Highlights

Plan Section	Summary of Plan Review, Analysis, and Updates
1. Introduction	Added an Executive Summary section. Verified/updated purpose, scope, etc. Updated Background.
2. Community Profile	Updated demographic, social & economic data, including the results of any recent annexations or new development. Expanded on social vulnerability analysis. Moved capability assessment section here (previously in Risk Assessment) and update data using Plan Update Guide.
3. Planning Process	Described and documented the planning process for the 2021 update, including coordination among agencies and integration with other planning efforts. Updated summary of changes. Described any changes in jurisdictional priorities. Described any changes in participation in detail. Described 2021 public participation process.
4. Risk Assessment	Revisited 2016 hazards list for possible modifications including possible human-caused hazards. Reviewed hazards from current Colorado State Hazard Mitigation Plan for consistency. Updated list of disaster declarations to include 2016-2021 data. Updated hazards data to include 2016-2021 data. Updated past occurrences for each hazard to include 2016-2021 data. Incorporated new hazard studies since 2016 and/or CWPPs/wildfire risk mapping. Added information on impacts of climate change on hazard frequency and severity. Updated critical facilities data. Provided/Updated replacement cost details to critical facilities, as data permits. Updated development and land use trends to include Census data, state, county, and local data sources. Updated historic and cultural resources. Updated current property values using 2021 Assessor’s data. Estimated flood losses using the latest flood hazard mapping and building counts and values. Updated NFIP data, CRS information, and Repetitive Loss data. Incorporated new hazard loss estimates since 2016, as applicable. Examined changes in growth and development will be examined; especially changes in the context of hazard-prone areas and how the changes may affect loss estimates and vulnerability. Conducted a HAZUS-MH Level I earthquake vulnerability analysis. Updated information regarding specific vulnerabilities to hazards, including maps and tables of specific assets at risk, specific critical facilities at risk, and specific populations at risk including social vulnerability. Updated maps in plan where appropriate Moved Capability Assessment to community profile section and update.
5. Mitigation Strategy	Updated based on the results of the updated risk assessment, completed mitigation actions, and implementation obstacles and opportunities over the last five years.

Plan Section	Summary of Plan Review, Analysis, and Updates
	<p>Reviewed goals and objectives to determine if they are still representative of the County's mitigation strategy, and update/revise as needed.</p> <p>Reviewed mitigation actions from the 2016 plan and develop a status report for each; identify if action has been completed, deleted, or deferred.</p> <p>Updated section on progress made since 2016 to include activities other than 2016 actions.</p> <p>Identified and detail new mitigation actions for all participating jurisdictions.</p> <p>Identified projects that have been submitted for funding and those that will be likely candidates for this funding.</p>
6. Plan Maintenance	Moved to Planning Process section; Kept adoption resolutions in Appendix.
Jurisdictional Annexes	<p>Updated previous participants' annexes with recent Census data.</p> <p>Updated past event history and hazard loss estimates.</p> <p>Added new maps and updated old maps as needed.</p> <p>Updated mitigation actions from 2016 and added new mitigation actions.</p>
Appendices	Updated as needed

3.3 Local Government 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.

The DMA planning regulations and guidance requires each local government seeking FEMA approval of its mitigation plan must participate in a planning process effort in the following ways:

- Participate in the process as part of the Hazard Mitigation Planning Committee (HMPC),
- Differentiate geographical locations or jurisdictions within the planning area where the hazard risk differs from that facing the entire planning area,
- Identify mitigation projects, specific to each jurisdictional entity, to be eligible for funding, and
- Engage the governing body for formal adoption of the plan.

For the Jefferson County HMPC, “participation” meant:

- Attending and participating in the HMPC meetings,
- Providing available data requested of the HMPC,
- Reviewing and providing comments on the plan drafts,
- Collecting and providing other requested data (as available);
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts; including annexes
- Informing the public, local officials, and other interested parties about the planning process, and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the governing boards.

The County and all jurisdictions with annexes to this plan seeking FEMA approval met all of these participation requirements. In most cases, one or more representatives for each jurisdiction attended the HMPC meetings described in Appendix B and also brought together a local planning team to help collect data, identify mitigation actions and implementation strategies, and review and provide data on plan drafts. Appendix C provides additional information and documentation of the planning process.

3.4 The 10-Step Planning Process

Wood established the planning process for Jefferson County’s plan using DMA planning requirements and FEMA’s associated guidance. This guidance is structured around a four-phase process:

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

Into this four-phase process, Wood integrated a more detailed 10-step planning process used for FEMA’s Community Rating System (CRS) and Flood Mitigation Assistance programs. 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, Building Resilient Infrastructure and Communities grant, High Hazard Potential Dams grant, and Flood Mitigation Assistance grant), Community Rating System, and the flood control projects authorized by the U.S. Army Corps of Engineers (USACE). Jefferson County, the City of Arvada, Golden, Lakewood, Wheat Ridge, and the Town of Morrison participate in the CRS, and thus could potentially earn planning credits from the development of this plan. Table 3-2 shows how the modified 10-step process fits into FEMA’s four-phase process, and how these elements correspond to the tasks in the FEMA “Mitigation Planning Handbook.”

Table 3-2 Jefferson County Hazard Mitigation Planning Process

FEMA’s 4-Phase DMA Process	Modified 10-Step CRS Process	FEMA Local Mitigation Planning Handbook Tasks
<i>1) Organize Resources</i>		
201.6(c)(1)	1) Organize the Planning Effort	1: Determine the planning area and resources
201.6(b)(1)	2) Involve the Public	2: Build the planning team - 44 CFR 201.6 (C)(1)
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies	3: Create an outreach strategy - 44 CFR 201.6(b)(1)
		4: Review community capabilities - 44 CFR 201.6 (b)(2)&(3)
<i>2) Assess Risks</i>		
201.6(c)(2)(i)	4) Identify the Hazards	5: Conduct a risk assessment - 44 CFR 201.6 (C)(2)(i) 44 CFR 201.6(C)(2)(ii)&(iii)
201.6(c)(2)(ii)	5) Assess the Risks	
<i>3) Develop the Mitigation Plan</i>		
201.6(c)(3)(i)	6) Set Goals	6: Develop a mitigation strategy - 44 CFR 201.6(c)(3)(i); 44 CFR 201(c)(3)(ii) and 44 CFR 201.6(c)(3)(iii)
201.6(c)(3)(ii)	7) Review Possible Activities	
201.6(c)(3)(iii)	8) Draft an Action Plan	
<i>4) Implement the Plan and Monitor Progress</i>		
201.6(c)(5)	9) Adopt the Plan	7: Review and adopt the plan

FEMA's 4-Phase DMA Process	Modified 10-Step CRS Process	FEMA Local Mitigation Planning Handbook Tasks
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan	8: Keep the plan current 9: Create a safe and resilient community - 44 CFR 201.6(c)(4)

3.4.1 Phase 1: Organize Resources

Planning Step 1: Organize the Planning Effort

The Jefferson County Sheriff's Office of Emergency Management (OEM) worked to establish the framework and organization for the development of the plan update. This process began with the FEMA planning grant application in 2018. Participating jurisdictions indicated their commitment to participate as evidenced by executing a letter of commitment as a component of the FEMA planning grant. Award of the grant in October 2019 allowed the planning consultant, Wood, to be procured through a competitive bid process.

Wood worked with the County to get organized for the plan update. Organizational efforts were initiated with the County and participating jurisdictions in December 2020 to inform and educate the plan participants of the purpose and need for updating the countywide hazard mitigation plan. An initial meeting between Wood and County OEM was held to discuss the organizational aspects of this plan update process. Invitations to the kickoff meeting for this plan update were extended to key County departments, the eight incorporated communities, and representatives from special districts for the County and municipalities, as well as to other federal, state, and local stakeholders that might have an interest in participating in the planning process. Representatives from participating jurisdictions and HMPC members to the 2016 plan were used as a starting point for the invite list, with additional invitations extended as appropriate throughout the planning process. The list of initial invitees is included in Appendix C.

Key stakeholders were identified including representatives from the various county departments, each municipal jurisdiction, and other state and local government agencies. An email was sent from County OEM to describe the upcoming mitigation planning efforts and invite potential members to participate in a kickoff meeting where the HMPC would be formally organized. Suggested representation from each municipality included city/town manager, emergency manager, floodplain manager, public works/engineering, building department and fire department/district representative. Table 3-3 lists the HMPC participants and their respective jurisdiction in the development of the plan. Other stakeholders that participated in the planning process are discussed under Planning Step 3: Coordinate with Other Departments and Agencies.

In the 2020-2021 plan update, the following communities and jurisdictions participated in the process.

Lead Jurisdiction

- Jefferson County

Municipalities

- City of Arvada
- City of Edgewater
- City of Golden
- City of Lakewood
- City of Wheat Ridge
- Town of Morrison

Special Districts

- Denver Water
- Arvada Fire Protection District (New)
- Elk Creek Fire Protection District (New)

- Evergreen Fire Protection District
- Fairmount Fire Protection District
- Foothills Fire Protection District (New)
- Genesee Fire Protection District (New)
- Golden Gate Fire Protection District (New)
- Indian Hills Fire Protection District
- Inter-Canyon Fire Protection District (New)
- Jefferson Conservation District
- Lookout Mountain Water District
- North Fork Fire Protection District
- West Metro Fire Protection District

The Town of Bow Mar, Town of Lakeside, Town of Mountain View, and Pleasant View Metropolitan District elected not to participate in the Jefferson County multi-jurisdictional planning process. The City of Westminster has its own hazard mitigation plan and did not participate in the Jefferson County multi-jurisdictional planning process since the City lies within both Jefferson and Adams County. The Town of Superior has a portion of their Town in Jefferson County but opted to participate in the Boulder County Hazard Mitigation Plan. The City of Littleton also has a small area in Jefferson County but participated in the Arapahoe County Multi-Hazard Mitigation Plan update.

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

The HMPC contributed to this planning process by:

- Providing facilities for meetings,
- Attending meetings,
- Collecting data,
- 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 was comprised of two groups, a Steering Committee that led the planning and decision-making efforts throughout the planning process, and a Working Group comprised of additional local staff that provided information to the Steering Committee. The Steering Committee is the group responsible for the 10-Step CRS planning process outlined in the 2017 CRS Coordinator's Manual. The Working Group supported the overall HMP process by providing information and data to the CRS Steering Committee for consideration and decision-making. Membership and participation in both the Steering Committee and Working Group are listed in Appendix B.

The HMPC communicated during the planning process with a combination of meetings, phone interviews, and email correspondence. All meetings were held virtually due to social distancing requirements associated with the ongoing COVID-19 pandemic. A folder on Google Drive was hosted by Wood and a SharePoint site hosted by the County were both used to share drafts of the plan and its annexes for jurisdictional review and input. Three planning meetings with the Planning Team were held during the plan's development between December 2020 and February 2021. The meeting schedule and topics are listed in the following table; all 10 planning process steps were covered in these three meetings. Agendas, meeting summaries, and attendance records for each of the meetings are included in Appendix C.

Table 3-3 Schedule of HMPC Meetings

Meeting Type	Meeting Topic	CRS Steps	Meeting Date(s)
HMPC #1 Kick-off Meeting	Introduction to DMA and the planning process Overview of current HMP; Organize Resources: the role of the HMPC, planning for public involvement, coordinating with other agencies/stakeholders Introduction to Hazard Identification	1,2,3	December 7, 2020
HMPC #2 Risk Assessment	Risk assessment overview and work session Development of mitigation goals and objectives;	2,4,5,6	January 11, 2021
HMPC #3 Mitigation Strategy and Goals Update	Identification, prioritization, and status update of mitigation actions; Discussion of process to monitor, evaluate, and update plan	7,8,9,10	February 11, 2021

HMPC Meeting #1 – Kickoff Meeting

On December 7, 2020, the HMPC convened virtually with 85 people participating, to kick off the plan update process. Wood presented information on the scope and purpose of the plan update, participation requirements of HMPC members, and the proposed project work plan and schedule. Plans for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. Wood also introduced the hazard identification requirements and data. The HMPC discussed past events and impacts and future probability for each of the hazards required by FEMA for consideration in a local hazard mitigation plan. The HMPC made two revisions to the hazards list from the 2016 plan, adding Pandemic and Cyber Attacks. Each jurisdiction provided updates to the plan and their respective annexes via a plan update guide and mitigation action tracker.

HMPC Meeting #2 – Risk Assessment Update

On January 11, 2021, the HMPC convened virtually to review and discuss the results of the risk and vulnerability assessment update (Steps 4 and 5). There were 81 members of the HMPC and stakeholders were present for the discussion. Wood presented the results the risk assessment for natural and human-caused hazards. The group went through each hazard together and discussed the results as well as shared any local insight to inform the HIRA update. Refer to the meeting summary in Appendix C for notes related to each hazard discussed. Some of this discussion was also related to the reviewing and updating the 2015-2016 goals.

HMPC Meeting #3 – Mitigation Strategy and Goals Update

The HMPC convened virtually on February 11, 2021 with 69 people participating to update the plan’s mitigation strategy. The group finalized the plan’s goals and objectives (Step 6) and discussed the criteria for mitigation action selection and prioritization using a worksheet provided by Wood. The group reviewed each possible new mitigation action and additional details were provided by the Planning Team (Step 7). The meeting ended with a review of the next steps and planning process schedule. Wood provided the Planning Team with a link to an online form to submit new mitigation actions. During the Planning Team review of the full plan, each member was provided a handout on prioritizing new mitigation actions and asked to focus on prioritizing each new mitigation action for their jurisdiction.

Planning Step 2: Involve the Public

Involving the public assures support from the community at large and is a part of the planning process. At the kickoff meeting, strategies to involve the public were discussed for soliciting public input on the mitigation plan and developed an outreach strategy by consensus. The fact that the process was conducted during the COVID-19 pandemic, with attendant restrictions on public gatherings, made it difficult to use many traditional outreach methods such as in-person public gatherings or discussions at other forums. The HMPC adapted by leveraging virtual meetings and other online messaging, which in

many cases resulted in greater public attendance and involvement than more traditional face-to-face meetings. An online public survey was developed by Wood and shared with the Planning Team to share through their respective public information channels. In addition to the online public survey, two virtual public workshops were held in January and June 2021.

These outreach efforts are summarized in Table 3-4 and discussed below.

Table 3-4 Summary of Public Outreach and Involvement Efforts

Event/Effort	Message	Dates	Methods Advertised
Online Public Survey	Personal experience with hazard events; public perception of hazard significance; what mitigation measures should be pursued.	January 6, - January 31, 2021	Website posting, Facebook, Twitter
Public Workshop #1 (virtual)	Overview of mitigation planning and plan update process; introduction to hazards and risk assessment; mitigation goals and objectives.	January 21, 2021	Website posting, Facebook, Twitter, YouTube
Public Workshop #2 (virtual)	Overview of draft plan; solicitation of feedback.	June 8, 2021	Website posting, Facebook, Twitter, YouTube
Public Review Draft	Public review and comment on the draft plan.	June 7-25, 2021	Website posting, Facebook
Virtual Public Room	Virtual room for the public to educate the public on mitigation planning and the 2021 plan update, as well as providing opportunities to review and comment on the draft plan.	June 7-25, 2021	Website posting, Facebook
YouTube	Videos of public workshops posted.	Ongoing	NA
Website notices	Notices of process, survey, public workshops, and public review draft posted at Jeffco.us	December 2020 – June 2021	NA
Facebook posts	Updates on process, survey, public workshops, and public review draft posted on County Facebook page.	December 2020 – June 2021	NA
Twitter posts	Updates on process, survey, public workshops, and public review draft posted on County Twitter account.	December 2020 – June 2021	NA
Newspaper article	Arvada Press article “Working Together to Reduce Wildfire Risk in Jefferson County”	March 16, 2021	NA

Online Public Survey

During the plan update’s initial drafting stage, an online public survey was used to gather public input to the Planning Team. The survey provided an opportunity for public input during the planning process, prior to finalization of the plan update. The survey gathered public feedback on concerns about hazards and input on mitigation strategies to reduce their impacts. The survey was released on January 6, 2021 and closed on January 31, 2021. The Planning Team provided links to the public survey by distributing it using social media, email, and posting the link on websites. A link to the survey was also posted on some of the participating jurisdictions’ websites as well as through social media posts; screenshots from both can be found in Appendix C. A total of 953 people filled out the survey online. Results showed that the public perceives the most significant hazards to be wildfire, drought, hailstorm and pandemic/public health. Question 4 of the survey asked the public’s opinion on what mitigation actions that should have the highest priority in the updated hazard mitigation plan; wildfire fuels treatment projects, forest health/watershed protection, water conservation, evacuation route development and public health incident preparedness were cited as the most popular mitigation actions. This information was shared with the Planning Team during the update of the mitigation strategy to consider when evaluating hazard rankings

and as a source of potential mitigation ideas. A summary of all the survey data and documentation of the public feedback can be found in Appendix D.

Figure 3-1 Hazard Mitigation Planning Survey Link on Jefferson County Twitter



Online Public Workshops

Two online public workshops were held during the planning process to inform the public, receive input to integrate into the plan update, and keep the public updated on the progress being made in the planning process. Both workshops were held virtually as webinars due to social distancing requirements associated with the ongoing COVID-19 pandemic.

The workshop took place on January 14, 2021 through Zoom. The workshop introduced the public to the hazard mitigation planning process for the County’s Plan Update and answered any questions and gather public input to be integrated into the plan update. In addition, it was an opportunity to help staff identify risks, hazards and vulnerabilities from the public’s perspective. In total 26 individuals participated in the virtual workshop. Members of the public were able to submit comments verbally or via the chat function. The Planning Team received four comments from the meeting that helped to inform the Planning Team on the public initial thoughts on hazard mitigation and hazards in their community. A recording of the meeting was subsequently posted on Jefferson County’s YouTube channel, where it has an additional 128 views as of July 1st, 2021.

The second virtual public workshop was held on June 8, 2021, again conducted via Zoom. Eight members of the public attended this meeting, which gave an update on the planning process, reviewed the results of the public survey, and introduced the updated Plan. The purpose, contents, and key components of the updated plan were described, and participants were encouraged to review and comment on the draft plan. A recording of the meeting was subsequently posted on Jefferson County’s YouTube channel, where it has an additional 10views as of July 1st, 2021.

Figure 3-2 Public Meeting #1 Screenshot, January 14, 2021



Public Review Period

Following the HMPC draft review a public review draft of the plan was prepared. The public was given an opportunity to provide input on this draft of the complete plan prior to its submittal to the State and FEMA. A virtual public engagement room was created for people to learn about the plan, download and review copies of the draft plan and annexes, and upload comments and feedback using an online survey tool. The draft plan and annexes were also made available on the County’s emergency management web page from June 7th–25th, 2021. The comment period was advertised extensively through the jurisdictions’ websites and social media accounts. The City of Arvada also made the plan available through their Speak Up Arvada platform. A total of eleven comments were received, which are included in Appendix B. The comments were reviewed with the Planning Team and used to inform revisions to the draft Plan.

Figure 3-3 Virtual Public Engagement Room



Planning Step 3: Coordinate with Other Departments and Agencies

Requirements §201.6(b): [T]he 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 Jefferson County. Coordination with these organizations and other community planning efforts is vital to the success of this plan update. The Jefferson 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 in meetings described in Step 1: Organize the Planning Effort.

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:

- Special Districts
 - Mile High Flood District*
 - Evergreen Metropolitan District*
- Neighboring county/municipality emergency management and floodplain management
 - Adams County*
 - Arapahoe County
 - Boulder County
 - Broomfield County*
 - Clear Creek County
 - Denver City and County
 - Denver Mountain Parks*
 - Douglas County
 - Gilpin County*
 - Park County
 - Westminster, City of*
- Nonprofits
 - Consolidated Mutual Water Company
- State Agencies
 - Colorado Division of Homeland Security and Emergency Management*
 - Colorado Division of Fire Prevention and Control (DFPC)*
 - Colorado Department of Parks and Wildlife*
 - Chatfield State Park*
 - Colorado Division of Water Resources – Dam Safety*
- Federal Agencies
 - US Forest Service*
- Universities
 - Colorado State University Extension

* Participated in HMPC meetings

The majority of the listed stakeholders were invited to participate through an email from the Jefferson County Emergency Manager on November 17, 2020, which included an invitation to the kickoff meeting. A complete list of agencies and persons invited to the kick off meeting, plus the invitation itself, can be referenced in Appendices B & C. As part of the public review and comment period for the draft plan, key agencies were again specifically solicited to provide any final input to the draft plan document. 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.

Coordination with key agencies, organizations, and advisory groups throughout the planning process allowed the HMPC to review common problems, development policies, and mitigation strategies as well as identifying any conflicts or inconsistencies with regional mitigation policies, plans, programs and regulations. Phone calls and emails were used during plan development to directly coordinate with key individuals representing other regional programs.

The HMPC also used technical data, reports, and studies from the following agencies and groups, just to name a few:

- Colorado Water Conservation Board
- Colorado Geological Survey
- FEMA
- Mile High Flood District

Appendix F References provides a detailed list of references used in the preparation of this plan update. Specific references relied on in the development of this plan are also sourced throughout the document as appropriate.

Several opportunities were provided for the groups listed above to participate in the planning process. At the beginning of the planning process, invitations were extended to these groups to actively participate on the HMPC. Specific participants from these groups are detailed in Appendix B. Others assisted in the process by providing data directly as requested or through data contained on their websites or as maintained by their offices. Further, as part of the public outreach process, all groups were invited to attend the public meetings and to review and comment on the plan prior to submittal to DHSEM and FEMA. In addition, as part of the review of the draft plan, key agency stakeholders were contacted, and their comments specifically solicited.

This process was accomplished as part of planning tasks two and three in the FEMA Local Mitigation Planning Handbook.

Incorporation of Existing Plans and Other Information

The coordination and synchronization with other community planning mechanisms and efforts are vital to the success of this plan. To have a thorough evaluation of hazard mitigation practices already in place, appropriate planning procedures should also involve identifying and reviewing existing plans, policies, regulations, codes, tools, and other actions are designed to reduce a community's risk and vulnerability from natural hazards. Jefferson County uses a variety of mechanisms to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible, comprehensive document that weaves the common threads of a community's values together. The development of this plan involved a comprehensive review of existing plans, studies, reports, and initiatives from Jefferson County and each participating municipality.

The following table includes a comprehensive list of the documents reviewed and how they informed the HMP update.

Table 3-5 Incorporated Plans, Studies, and Reports

Plan	How Incorporated
Jefferson County Comprehensive Master Plan (CMP) 2013	Used as baseline for update and incorporated into Community Profile, Planning Process, Risk and Vulnerability Assessment, Capabilities Assessment, Mitigation Strategy, and Implementation
Jefferson County Comprehensive Master Plan Findings for 2019 Update	Informed growth and development trends and demographics for Community Profile.
Jefferson County Emergency Preparedness Guide (2018)	Incorporated into Risk and Vulnerability Assessment
Jefferson County Open Space Master Plan 2014-2019	Incorporated into Community Profile, Capabilities Assessment and Wildfire Vulnerability Assessment
Individual Community Land Use Plans (12 separate documents)	Incorporated data into Jurisdictional Annexes for Future Planning and Development patterns
Jefferson County Economic Profile, JeffCo Economic Development Corporation 2015	Incorporated into Community Profile and Risk and Vulnerability Assessment
County Community Wildfire Protection Plan (2012)	Incorporated into Community Profile and Wildfire Vulnerability Assessment
Individual Community Wildfire Protection Plans (16 separate documents)	Incorporated data into Jurisdictional Annexes and Wildfire Vulnerability Assessment
Jefferson County Land Development Regulation	Informed Capabilities, Risk and Vulnerability Assessments and goals update in Section 5
Jefferson County Zoning Resolution	Incorporated into Capabilities Assessment
Addendum to 2018 Jefferson County Residential Code and Supplement – Appendix Z Special Building Construction Regulations in Wildfire Zone 1 (Effective January 1, 2020)	Incorporated into Capabilities Assessment
Jefferson County Floodplain Regulations	Incorporated into Capabilities Assessment
Grading, Erosion, and Sediment Control Regulation – Section 17 of the Jefferson County Land Development Regulation	Incorporated into Capabilities Assessment
Construction/Land Disturbance Activities Section 16	Incorporated into Capabilities Assessment
Jefferson County Roadway Design and Construction Manual	Incorporated into Capabilities Assessment
2018-2023 State of Colorado Hazard Mitigation Plan	Informed data sources and information gathering and goals update
Colorado Drought Mitigation & Response Plan 2018	Informed data sources and information gathering
City of Arvada Comprehensive Plan	Used as baseline for Annex update and incorporated into Community Profile, Planning Process, Risk and Vulnerability Assessment, Mitigation Strategy, and Implementation
City of Arvada Sustainable Action Plan (ASAP)	Informed Annex update
City of Arvada Land Development Code	Informed Annex update
City of Arvada Parks and Open Space Master Plan	Informed Annex update
City of Lakewood Community Resources Master Plan	Informed Annex update
City of Lakewood Comprehensive Plan	Used as baseline for Annex update and incorporated into Community Profile, Planning Process, Risk and

Plan	How Incorporated
	Vulnerability Assessment, Mitigation Strategy, and Implementation
City of Lakewood Zoning Ordinance/Floodplain Management	Informed Annex update
City of Wheat Ridge Strategic Plan	Informed Annex update
City of Wheat Ridge Comprehensive Plan	Informed Annex update
City of Wheat Ridge Parks and Recreation Master Plan	Informed Annex update
City of Wheat Ridge Zoning and Development Code	Informed Annex update
City of Golden Comprehensive Plan	Used as baseline for Annex update and incorporated into Community Profile, Planning Process, Risk and Vulnerability Assessment, Mitigation Strategy, and Implementation
City of Golden Land Use Plan	Informed Annex update
City of Edgewater Master Plan	Informed Annex update
Town of Morrison Ordinances	Informed Annex update
Town of Mountain View Master Plan	Informed Annex update

Other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. See also Appendix F for other references.

2016 Mitigation Plan Inclusion in Other Planning Mechanisms

The 2016 HMP was integrated into other planning mechanisms in the County. The risk assessment portion of the 2016 plan was integrated into the other planning mechanisms listed in Table 3-6. The table lists the jurisdiction and what planning mechanism the 2016 Plan was integrated into. In some cases, communities have deferred this for future planning mechanisms, as discussed in the Section 6 Plan Implementation and Maintenance.

Table 3-6 2016 Mitigation Plan Inclusion in Other Planning Mechanisms

Jurisdiction	Planning Mechanism
Jefferson County	Goals and approaches from 2016 HMP were included in the Jefferson County Comprehensive Master Plan (CMP) and regulation updates.
	The 2016 Jefferson County HMP was made available on the Emergency Management and Preparedness page on the Sheriff’s Office web portal
Wheat Ridge	City of Wheat Ridge Local Energy Assurance Plan 2012. Hazard Mitigation Plan is cross referenced in several sections. Provided the basis for hazard profiles in the vulnerability assessment
State of Colorado	The 2018-2023 Colorado Hazard Mitigation Plan provides a meta-level analysis of local and multi-jurisdictional hazards profiled (with rankings for each hazard in each jurisdiction) in respective plans. Jefferson County’s 2016 plan is included in this analysis.
	The 2018 Colorado Drought Mitigation Response Plan references local hazard mitigation plans and efforts, including Jefferson County.
Lakewood	Adopted by referenced in City Emergency Operations Plan as an important planning element and background on the various natural hazards and risks in the City.

Jurisdiction	Planning Mechanism
Arvada	2016 HIRA was incorporated into the City's Emergency Operations Plan. Floodplain regulations were updated and adopted in 2020. Incorporation into the Comprehensive Plan was deferred for incorporation by reference in future planning mechanisms (2023 Update).
Edgewater	Information from 2016 HMP was incorporated into Comprehensive Plan and is considered when updating local codes and plans.
Golden	Information from the 2016 HMP was incorporated into the City's Emergency Operations Plan
Morrison	Deferred for incorporation by reference in future planning mechanisms
Fire Districts	Fairmount FPD incorporated 2016 HMP into Strategic Plan and Standards of Coverage, which describes the District's response plans within the community. West Metro FPD considers and references the 2016 HMP where applicable.
Jefferson Conservation District	Deferred for incorporation by reference in future planning mechanisms, where applicable

3.4.2 Phase 2: Assess Risks

Planning Step 4 Identify the Hazards

Wood led the HMPC in an effort to identify and document all the hazards that have, or could, impact the planning area, including documenting recent drought, flood, wildfire and winter storm events. Data collection worksheets were used in this effort to aid in determining hazards and vulnerabilities and where risk varies across the planning area. The profile of each of these hazards was then developed and updated for 2021 with information from the HMPC and additional sources. 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. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A more detailed description of the hazard identification and risk assessment process and the results are included in Section 4 Risk Assessment.

Planning Step 5 Assess the Risks

After updating the profiles of the hazards that could affect the 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 updated their assets at risk to natural hazards—overall and in identified hazard areas. These assets included the total number and value of structures; critical facilities and infrastructure; natural, historic, and cultural assets; and economic assets. The HMPC also analyzed development trends in hazard areas. The DFIRM was used to refine the estimated flood losses during the update, where available for the NFIP participating communities. The results of the vulnerability assessment are included in Section 4 Risk Assessment.

Capability Assessment— The HMPC also conducted a capability assessment update to review and document the planning area's current capabilities to mitigate risk and vulnerability from natural hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC can assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. This information for is included in Section 2.7 and in the respective jurisdictional annexes.

Wood provided the draft risk assessment to the HMPC in March 2021 for review and comment. Results of the risk assessment were presented and comments discussed at the second meeting of the HMPC.

3.4.3 Phase 3: Develop the Mitigation Plan

Planning Step 6: Set Goals

Wood facilitated a discussion session with the HMPC to review the 2016 plan's goals and objectives. The HMPC discussed definitions and examples of goals, objectives, and actions and considered the goals of

the state hazard mitigation plan and other relevant local plans when reviewing and revising the goals and objectives. The resulting updated goals and objectives are presented in Section 5 Mitigation Strategy.

Planning Step 7: Review Possible Activities

Wood facilitated a discussion at an HMPC meeting to review the alternatives for mitigating hazards. This included a brainstorming session with the HMPC to identify a comprehensive range of mitigation actions for each identified hazard, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. More specifics on the process and the results of this collaborative process are captured in Section 5 Mitigation Strategy.

Planning Step 8: Draft an Action Plan

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

3.4.4 Phase 4: Implement the Plan and Monitor Progress

Planning Step 9: Adopt the Plan

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

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

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Section 6 Plan Implementation and Maintenance.

Finally, there are numerous organizations within the Jefferson County planning area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is vital to the ongoing success of this plan and mitigation in Jefferson County and is addressed further in Section 6. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Section 6.

Implementation and Maintenance Process: 2016 Plan

The 2016 Hazard Mitigation Plan included a process for implementation and maintenance which was generally followed, with some variation. Implementation of the plan including the status of mitigation actions is captured in Section 5 and the jurisdictional annexes. In general, the County and participating jurisdictions have made good progress in the implementation of the plan. Successes of note are detailed in Section 5. As a result of revisiting the implementation and maintenance section some modifications were made including:

- Changed annual review from October to January.

An updated implementation and maintenance section can be referenced in Section 6.

4 Risk Assessment

- DMA Requirement §201.6(c)(2):

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

(i) A description of the type, 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.

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

(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

(B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate;

(C) 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.

(iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

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

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

This risk assessment followed the methodology described in the FEMA publication: Local Mitigation Planning Handbook (March 2013), which breaks the risk assessment down to a four-step process:

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

A key step in preventing disaster losses in Jefferson County is developing a comprehensive understanding of the hazards that pose risks to its communities. The following terms facilitate comparisons between communities and can be found throughout the Plan.

- **Hazard:** Event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, other types of harm or loss
- **Risk:** Product of a hazard's likelihood of occurrence and its consequences to society; the estimated impact that a hazard would have on people, services, facilities, and structures in a community
- **Vulnerability:** Degree of susceptibility to physical injury, harm, damage, or economic loss; depends on an asset's construction, contents, and economic value of its functions.

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

- **Section 4.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Asset Summary** describes the people, property, infrastructure, and resources potentially exposed to risk across Jefferson.
- **Section 4.3 Hazard Profiles** discusses the hazards that threaten the county, describes previous occurrences, their geographic extent, potential magnitude, and assesses their probability of future occurrence. It also includes a vulnerability assessment for each hazard, considering assets at risk, critical facilities, and future development trends.
- **The Jurisdictional Annexes** discuss each participating jurisdiction’s individual exposure to natural hazards, including how the threat of hazards varies across the planning area along with each jurisdiction’s specific vulnerabilities.

4.1 Hazard Identification

The Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine the hazards that threaten the planning area.

4.1.1 Results and Methodology

Using existing hazards data, plans from participating jurisdictions, and input gained through planning and public meetings, the HMPC agreed upon a list of hazards that could affect Jefferson County. Hazards data was obtained from various federal, state, and local sources such as FEMA, the Colorado Geological Survey (CGS), the Colorado Dam Safety Branch (DSB), the National Oceanic and Atmospheric Administration’s (NOAA) National Center for Environmental Information (NCEI), the United States Geological Survey (USGS), and the Colorado Division of Homeland Security and Emergency Management (including the 2018 Colorado State Hazard Mitigation Plan), among others. 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.

Sixteen natural hazards were profiled in the 2016 Jefferson County Hazard Mitigation Plan. The HMPC reviewed all of these hazards and determined they were all still relevant and should be continued into the 2021 Plan update. Additionally, the HMPC reviewed a number of human-caused hazards and elected to include the two of greatest concern as hazards new to the plan: cyber attack and pandemic.

Each of the hazards were identified based on geographic extent, previous occurrences, potential for future occurrence, and a discussion on the potential severity and magnitude of the event. The potential impacts of climate change on each hazard were also considered. Once these elements were examined, each hazard was assigned an overall rating for the County.

The following hazards were determined to have a high significance:

- Dam Failure
- Flood
- Hailstorm
- Wildfire
- Severe Winter Storms

The following hazards were determined to have a medium significance:

- Cyber Attack (new)
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soils
- Landslides/Debris Flows/Rockfalls
- Lightning
- Pandemic (new)
- Subsidence
- Tornado
- Windstorm

The following hazards were determined to have a low significance:

- Avalanche
- Extreme Temperatures

For many hazards, the risk varies between jurisdictions; the jurisdictional annexes provide more explicit detail to explain the variance levels.

4.1.2 Hazard Identification Summary

Table 1-1 reflects the hazard identification summaries discussed in detail in the rest of this section. The table is based on the Jefferson County Hazards Identification Worksheet, but also reflects the input from the HMPC to address magnitude and severity, which in some cases altered the overall rating of the hazard compared to the other hazards profiled. When viewing these ratings, it is particularly important to remember that the hazards are all possible in the planning area, and therefore are potentially dangerous. The overall rating is a method of prioritizing hazards relative to one another for the development of mitigation actions and goals.

Table 4-1 Hazards Identification Summary

Hazard	Geographic Extent	Probability of Future Occurrence	Potential Severity/Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Extensive	Occasional	Critical	High
Drought	Extensive	Likely	Critical	High
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Extensive	Likely	Limited	Medium
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Critical	High
Hailstorm	Significant	Likely	Critical	High
Landslide/Debris/Rockfall	Limited	Likely	Limited-Negligible	Medium
Lightning	Limited	Highly Likely	Limited	Medium
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Medium
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Significant	Highly Likely	Limited	Medium

Geographic Extent
Negligible: Less than 10 percent of planning area or isolated single-point occurrences
Limited: 10 to 25 percent of the planning area or limited single-point occurrences
Significant: 25 to 75 percent of planning area or frequent single-point occurrences
Extensive: 75 to 100 percent of planning area or consistent single-point occurrences

Potential Severity/Magnitude
Negligible: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.
Limited: 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.
Critical: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.
Catastrophic: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.

Probability of Future Occurrences
Unlikely: Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.
Occasional: Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Likely: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years
Highly Likely: Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.

Overall Significance
Low: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. Also used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.
Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. Also used for hazards with a high impact rating but an extremely low frequency.
High: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. Also used for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.

4.1.3 Hazards Not Profiled

Other hazards were discussed by the HMPC but ultimately not included in this plan. Thunderstorm is not identified as an individual hazard, but is recognized for its role in the flood, lightning, and windstorm hazards, and addressed accordingly in those hazard profiles. Fog was also discussed and determined that it is not a true disaster-level hazard for the planning area. The volcano hazard was also removed due to the extraordinary circumstances required for such a disaster event to severely impact the planning area. The natural hazards of coastal erosion, coastal storm, hurricane, and tsunami were excluded from this plan because they are not applicable in Jefferson County.

Several other human-caused hazards were also considered, to include hazardous materials incidents, active threats, transportation accidents, and infrastructure failures. While all those hazards have the potential to impact Jefferson County, the HMPC elected to focus mitigation efforts on the two human-caused hazards that present the greatest risk: cyber attack and pandemic.

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

4.1.4 Disaster Declaration History

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

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. The Fire Management Assistance Grant Program provides funding "for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster." The quantity and types of damages, as well as the type of event, determine the source of federal aid.

Table 4-2 provides information on the 13 federal emergencies and disasters declared in Jefferson County between 1953 and January 2021.

Table 4-2 Federal Disaster Declarations in Jefferson County

Year	Declaration	Disaster Type
1969	Federal Disaster Declaration	Severe Storms and Flooding
1973	Federal Disaster Declaration	Heavy Rains, Snowmelt
2000	Fire Management Assistance Declaration	High Meadows Fire
2002	Fire Management Assistance Declaration	Schoonover Fire, Black Mountain Fire, Snaking Fire, and Hayman Fire
2003	Emergency Declaration	Snow
2005	Emergency Declaration	Hurricane Katrina Evacuation*
2007	Emergency Declaration	Snow
2011	Fire Management Assistance Declaration	Indian Gulch Fire
2012	Fire Management Assistance Declaration	Lower North Fork Fire
2012	USDA Drought Declaration (Primary S3260)	Drought, excessive heat, high winds
2013	Emergency Declaration Federal Disaster Declaration	Severe Storms, Flooding, Landslides and Mudslides
2020	Emergency Declaration and Federal Disaster Declaration	COVID-19 Pandemic

Source: State of Colorado Natural Hazards Mitigation Plan, 2013; Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site. U.S. Department of Agriculture; (*) indicates that Jefferson County was included in the declaration but did not receive funding.

A USDA declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. The SBA also offers low interest loans for eligible businesses that suffer economic losses in declared and contiguous counties that have been declared by the USDA. This program enables eligible farmers and ranchers in the affected county as well as contiguous counties to apply for low interest loans. In 2012 the USDA streamlined the declaration process which now provides for nearly an automatic designation for any county in which drought conditions, as reported in the U.S. Drought Monitor when any portion of a county meets the D2 (Severe Drought) drought intensity value for eight consecutive weeks. A county that has a portion of its area in a drought intensity value of D3 (Extreme Drought) or higher at any time during the growing season also would be designated as a disaster area. USDA Declarations since that covered Jefferson County are shown in **Table 4-3**.

Table 4-3 USDA Declarations Including Jefferson County

Year	Declaration	Disaster Type
2012	S3260	Drought, excessive heat, high winds
2013	S3456	Drought, excessive heat, high winds, wildfire, insects
2013	S3548	Drought, excessive heat, high winds, wildfire, insects
2018	S4365	Hail and high wind
2018	S4386	Drought
2018	S4408	Drought
2019	S4468	Drought
2019	S4481	Drought

Year	Declaration	Disaster Type
2020	S4798	Drought
2020	S4848	Drought

Source: U.S. Department of Agriculture <https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information>

4.2 Asset Summary

4.2.1 Population and Structures

Table 4-4 shows the estimated total population and number of housing units for each jurisdiction based on the most recent American Community Survey and Colorado State Demography Office data. Jurisdictions that straddle County boundaries are indicated by an asterisk, and the numbers listed for these jurisdictions only represent the Jefferson County portion.

Table 4-4 Population and Housing Unit Exposure by Jurisdiction

Jurisdiction	2019 Population Estimate	2019 Housing Units Estimate
Arvada*	117,859	42,558
Bow Mar*	300	95
Edgewater	5,352	1,697
Golden	20,828	6,134
Lakeside	8	1
Lakewood	158,410	51,150
Littleton*	2,683	800
Morrison	436	135
Mountain View	536	241
Westminster*	44,162	15,090
Wheat Ridge	31,273	12,141
Unincorporated	201,234	76,455
Grand Total	583,081	206,497

Source: Colorado Department of Local Affairs Demography Section. * Only includes the portion within Jefferson County.

Building value assessments in this plan are based on data from the Jefferson County’s Assessor’s Office. Table 4-5 shows the total property inventory from the Assessor’s Office. (The Assessor’s Office assigns values to buildings for the specific purpose of valuation for ad valorem tax purposes, and values represented may not reflect actual building replacement values.) An address points layer was used as the basis for estimating building counts. The Assessor does not maintain data about the contents of structures, therefore the contents values shown in the table are estimates based upon the structure value using FEMA recommended values (typically 50% for residential structures, 100% for commercial, 100% for agricultural, 150% for industrial, 100% for mixed use and 100% for exempt). **Table 4-6** summarizes the property inventory for the County and each participating jurisdiction with detail by property type, including jurisdictions which may not be participating in the plan.

Table 4-5 Jefferson County's Building Inventory and Value Summary by Jurisdiction

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value
Arvada*	42,022	43,997	\$14,257,089,578	\$7,838,936,533	\$22,096,026,111
Bow Mar*	95	95	\$54,914,896	\$27,457,448	\$82,372,344
Edgewater	1,480	1,807	\$442,322,263	\$256,618,931	\$698,941,194
Golden	5,866	6,955	\$3,581,405,037	\$2,429,883,569	\$6,011,288,606
Lakeside	14	27	\$28,589,790	\$28,589,790	\$57,179,580
Lakewood	49,390	54,129	\$18,577,041,933	\$10,715,684,254	\$29,292,726,187
Littleton*	803	803	\$352,400,836	\$352,400,836	\$704,801,672
Morrison	155	188	\$65,397,995	\$42,262,140	\$107,660,135
Mountain View	246	273	\$46,888,818	\$27,130,145	\$74,018,963
Westminster*	15,050	15,691	\$5,793,485,591	\$3,387,532,303	\$9,181,017,894
Wheat Ridge	11,165	13,505	\$3,635,566,208	\$2,219,156,222	\$5,854,722,430
Unincorporated	76,220	79,412	\$29,606,470,107	\$15,953,167,281	\$45,559,637,388
Grand Total	202,506	216,882	\$76,441,573,052	\$43,278,819,451	\$119,720,392,503

Source: Jefferson County Assessor October 2020, FEMA HAZUS

* Only includes the portion within Jefferson County.

Table 4-6 Jefferson County's Building Inventory and Value Detail by Jurisdiction

Jurisdiction	Property Type	Improved Parcels	Building Count	Improved Value	Content Value	Total Value
Arvada*	Agriculture	8	8	\$2,760,667	\$2,760,667	\$5,521,334
	Commercial	515	856	\$550,997,194	\$550,997,194	\$1,101,994,388
	Exempt	125	144	\$312,137,969	\$312,137,969	\$624,275,938
	Industrial	199	247	\$212,035,772	\$318,053,658	\$530,089,430
	Mixed Use	147	184	\$130,816,114	\$130,816,114	\$261,632,228
	Residential	41,028	42,558	\$13,048,341,862	\$6,524,170,931	\$19,572,512,793
	Total	42,022	43,997	\$14,257,089,578	\$7,838,936,533	\$22,096,026,111
Bow Mar*	Residential	95	95	\$54,914,896	\$27,457,448	\$82,372,344
	Total	95	95	\$54,914,896	\$27,457,448	\$82,372,344
Edgewater	Commercial	45	79	\$35,300,820	\$35,300,820	\$70,601,640
	Exempt	12	13	\$24,162,201	\$24,162,201	\$48,324,402
	Industrial	2	2	\$304,000	\$304,000	\$608,000
	Mixed Use	10	16	\$11,148,577	\$11,148,577	\$22,297,154
	Residential	1,411	1,697	\$371,406,665	\$185,703,333	\$557,109,998
	Total	1,480	1,807	\$442,322,263	\$256,618,931	\$698,941,194
Golden	Agriculture	1	1	\$35,437	\$35,437	\$70,874
	Commercial	277	377	\$530,314,287	\$530,314,287	\$1,060,628,574
	Exempt	61	126	\$331,145,437	\$331,145,437	\$662,290,874
	Industrial	171	189	\$288,997,711	\$288,997,711	\$577,995,422
	Mixed Use	111	128	\$127,869,228	\$127,869,228	\$255,738,456
	Residential	5,245	6,134	\$2,303,042,937	\$1,151,521,469	\$3,454,564,406

Jurisdiction	Property Type	Improved Parcels	Building Count	Improved Value	Content Value	Total Value
	Total	5,866	6,955	\$3,581,405,037	\$2,429,883,569	\$6,011,288,606
Lakeside	Commercial	13	26	\$22,234,756	\$22,234,756	\$44,469,512
	Mixed Use	1	1	\$6,355,034	\$6,355,034	\$12,710,068
	Total	14	27	\$28,589,790	\$28,589,790	\$57,179,580
Lakewood	Agriculture	1	1	\$46,378	\$46,378	\$92,756
	Commercial	1,235	2,115	\$2,012,874,841	\$2,012,874,841	\$4,025,749,682
	Exempt	159	229	\$412,727,409	\$412,727,409	\$825,454,818
	Industrial	165	269	\$179,504,955	\$179,504,955	\$359,009,910
	Mixed Use	301	365	\$249,172,992	\$249,172,992	\$498,345,984
	Residential	47,529	51,150	\$15,722,715,358	\$7,861,357,679	\$23,584,073,037
	Total	49,390	54,129	\$18,577,041,933	\$10,715,684,254	\$29,292,726,187
Littleton*	Commercial	2	2	\$3,201,717	\$3,201,717	\$6,403,434
	Exempt	1	1	\$1,565,994	\$1,565,994	\$3,131,988
	Residential	800	800	\$347,633,125	\$347,633,125	\$695,266,250
	Total	803	803	\$352,400,836	\$352,400,836	\$704,801,672
Morrison	Commercial	20	36	\$6,526,206	\$6,526,206	\$13,052,412
	Exempt	6	6	\$9,920,151	\$9,920,151	\$19,840,302
	Industrial	2	2	\$482,576	\$482,576	\$965,152
	Mixed Use	8	9	\$2,197,352	\$2,197,352	\$4,394,704
	Residential	119	135	\$46,271,710	\$23,135,855	\$69,407,565
	Total	155	188	\$65,397,995	\$42,262,140	\$107,660,135
Mountain View	Commercial	16	28	\$6,507,708	\$6,507,708	\$13,015,416
	Exempt	2	2	\$359,593	\$359,593	\$719,186
	Mixed Use	2	2	\$504,171	\$504,171	\$1,008,342
	Residential	226	241	\$39,517,346	\$19,758,673	\$59,276,019
	Total	246	273	\$46,888,818	\$27,130,145	\$74,018,963
Westminster*	Commercial	195	402	\$381,774,297	\$381,774,297	\$763,548,594
	Exempt	24	26	\$104,426,475	\$104,426,475	\$208,852,950
	Industrial	77	127	\$124,568,101	\$124,568,101	\$249,136,202
	Mixed Use	45	46	\$370,810,142	\$370,810,142	\$741,620,284
	Residential	14,709	15,090	\$4,811,906,576	\$2,405,953,288	\$7,217,859,864
	Total	15,050	15,691	\$5,793,485,591	\$3,387,532,303	\$9,181,017,894
Wheat Ridge	Agriculture	2	2	\$22,618	\$22,618	\$45,236
	Commercial	414	723	\$416,007,224	\$416,007,224	\$832,014,448
	Exempt	59	76	\$114,136,176	\$114,136,176	\$228,272,352
	Industrial	279	391	\$214,853,118	\$214,853,118	\$429,706,236
	Mixed Use	134	172	\$57,727,100	\$57,727,100	\$115,454,200
	Residential	10,277	12,141	\$2,832,819,972	\$1,416,409,986	\$4,249,229,958
	Total	11,165	13,505	\$3,635,566,208	\$2,219,156,222	\$5,854,722,430
Unincorporated	Agriculture	67	70	\$7,972,025	\$7,972,025	\$15,944,050
	Commercial	907	1,480	\$1,311,289,870	\$1,311,289,870	\$2,622,579,740

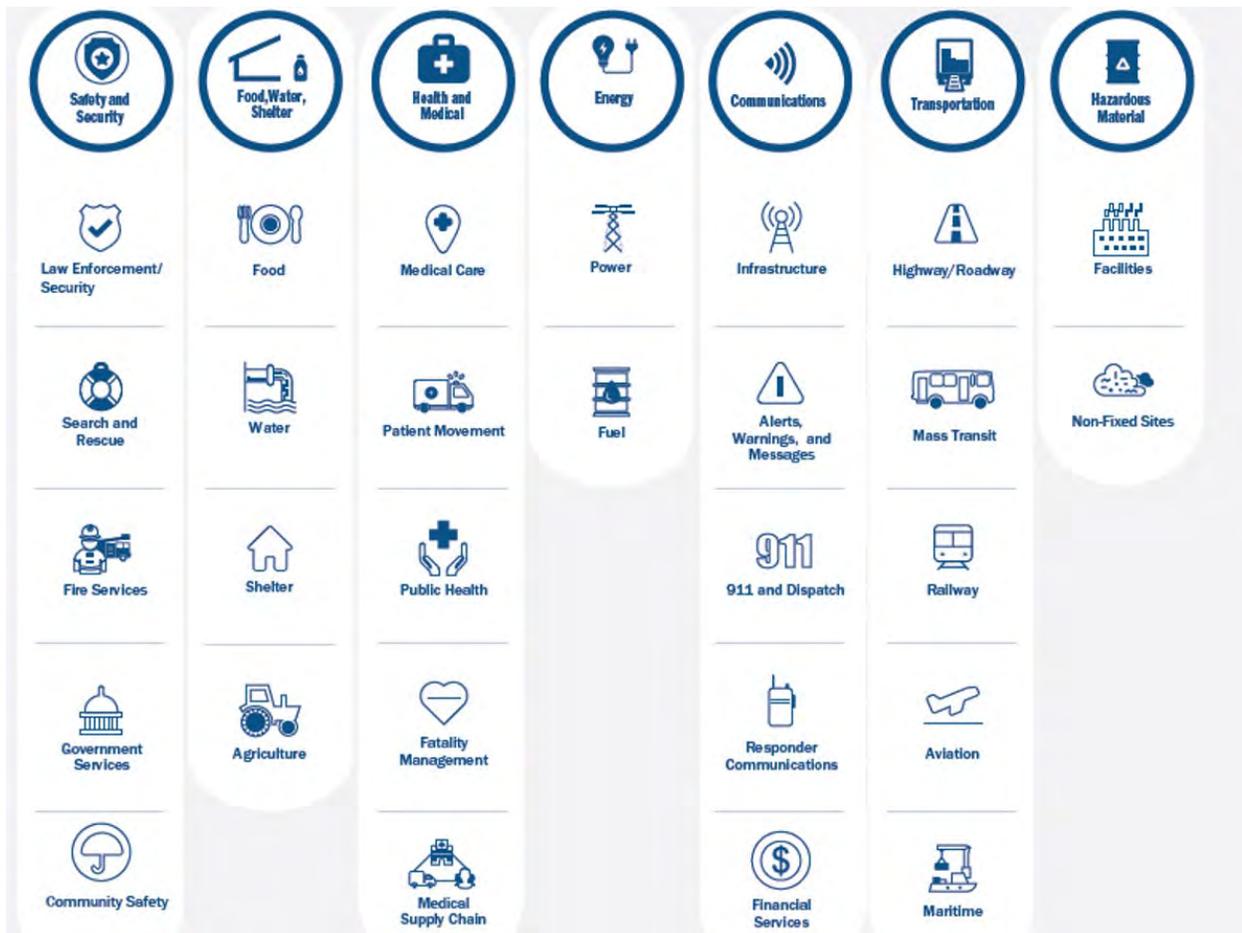
Jurisdiction	Property Type	Improved Parcels	Building Count	Improved Value	Content Value	Total Value
	Exempt	247	310	\$453,766,591	\$453,766,591	\$907,533,182
	Industrial	612	777	\$289,775,043	\$289,775,043	\$579,550,086
	Mixed Use	296	320	\$237,060,925	\$237,060,925	\$474,121,850
	Residential	74,091	76,455	\$27,306,605,653	\$13,653,302,827	\$40,959,908,480
	Total	76,220	79,412	\$29,606,470,107	\$15,953,167,281	\$45,559,637,388
Grand Total	202,506	216,882	\$76,441,573,052	\$43,278,819,451	\$119,720,392,503	

Source: Jefferson County Assessor 2020, FEMA HAZUS * Only includes the portion within Jefferson County.

4.2.2 Critical Facilities, Infrastructure, and Other Important Community Assets

For the purposes of this plan, a critical facility is defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA sorts critical facilities into seven lifeline categories as shown in Figure 4-1.

Figure 4-1 Lifeline Categories



These lifeline categories standardize the classification of critical facilities and infrastructure that provide indispensable service, operation, or function to a community. A lifeline is defined as providing indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security. These categorizations are particularly useful as they:

- Enable effort consolidations between government and other organizations (e.g. infrastructure owners and operators).
- Enable integration of preparedness efforts among plans; easier identification of unmet critical facility needs.
- Refine sources and products to enhance awareness, capability gaps, and progress towards stabilization.
- Enhance communication amongst critical entities, while enabling complex interdependencies between government assets.

Highlight lifeline related priority areas regarding general operations as well as response efforts.

To develop a comprehensive list of critical facilities in Jefferson County (Table 4-7), two data sources were compiled and broken down along the aforementioned critical asset categories: Jefferson County’s GIS databases of critical facilities and infrastructure and the 2020 Homeland Infrastructure Foundation-Level Data (HIFLD) data.

The best available data was used, but some limitations include lack of complete or comprehensive data and values such as replacement costs. These databases were used in vulnerability assessments for hazards such as wildfire and flood, and are represented in maps and tables in the vulnerability by hazard section that follows.

Table 4-7 Summary of Critical Facilities by Jurisdiction and Lifeline

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total
Arvada	93	8	-	15	42	51	80	289
Edgewater	4	-	1	-	1	7	1	14
Golden	76	2	2	24	4	26	19	153
Lakewood	216	10	8	24	66	85	47	456
Morrison	8	-	-	3	1	2	8	22
Wheat Ridge	68	1	-	11	24	22	35	161
Unincorporated	705	23	24	51	48	135	267	1253
Total	1,170	44	35	128	186	328	457	2,348

Source: HIFLD and CERC

A 2020 Federal Highway Administration report found 22 bridges in Jefferson County in poor condition and in need of repairs. An additional 259 were found to be in fair condition, with only 166 being in good condition.

Maps of critical facilities in Jefferson County can be found in Appendix H (not for public release).

4.2.3 Natural, Historic, and Cultural Resources

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

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

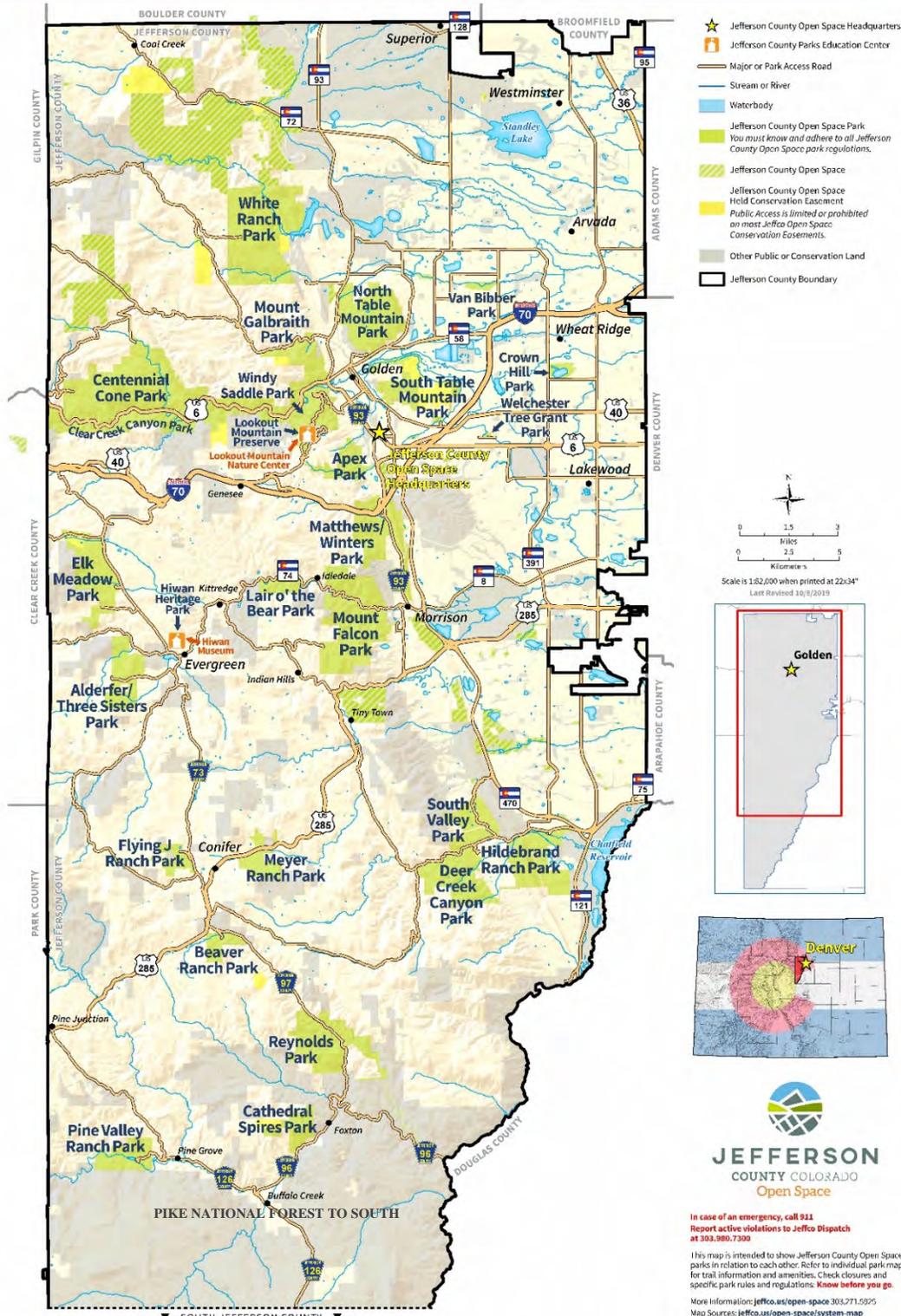
Natural resources are important to include in benefit-cost analyses for future projects, and may be used to leverage additional funding for projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple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

Jefferson County contains a unique combination of prairie, forest, and tundra environments. The HMPC recognizes three types of valuable natural resources worthy of protection: environmental conservation areas, natural landmarks, and natural areas. These areas are described below and mapped in Figure 4-2.

- **Environmental conservation areas** are so designated because of the value they provide in the perpetuation of those species, biological communities, and ecological processes that function over large geographic areas and require a high degree of naturalness.
- **Natural landmarks** are defined as prominent landscape features that distinguish a specific locality in Jefferson County and are important because of the views they afford, their value as scenic vistas and backdrops, and the intrinsic value they hold as wildlife or plant habitats, natural areas, park and open space preserves, and open land areas.
- **Natural areas** are physical or biological areas that either retain or have reestablished their natural characters, although they need not be completely undisturbed, and that typify native vegetation and associated biological and geological features or provide habitat for rare or endangered animal or plant species or include geologic or other natural features of scientific or educational value.

Figure 4-2 Jefferson County Public Lands

JEFFERSON COUNTY OPEN SPACE Park System



In case of an emergency, call 911
Report active violations to Jeffco Dispatch at 303.980.7300

This map is intended to show Jefferson County Open Space parks in relation to each other. Refer to individual park maps for trail information and amenities. Check closures and specific park rules and regulations. Know before you go.

More Information: jeffco.us/open-space 303.271.5975
Map Sources: jeffco.us/open-space/system-map

Wetlands

Wetlands are a valuable natural resource for communities, due to their benefits to water quality, wildlife protection, recreation, and education. Wetlands also play an important role in hazard mitigation by reducing flood peaks and slowly releasing 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.

Jefferson County has numerous freshwater lakes and freshwater emergent wetlands in the various creeks and ditches scattered throughout the northeast (mostly urbanized) part of the County. These areas provide critical habitat as well as help mitigate flooding.

Endangered Species and Imperiled Natural Plant Communities

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed. Species listed as resolved taxon have received a finding of Not Warranted or Not Substantial or have been removed from the candidate list.

According to the U.S. Fish and Wildlife Service (FWS), as of February 2021, there were 27 federal endangered, threatened, or candidate species that may be present Jefferson County. These species are listed in Table 4-8. Note that the FWS is based on the existence of potential habitat for the species, and not all listed species may actually be present in the County.

Table 4-8 Threatened, Endangered, or other Listed Species Potentially Found in Jefferson County

Type of Species	Common Name	Scientific Name	Status
Amphibians	Northern leopard frog	<i>Rana pipiens</i>	Resolved Taxon
Birds	Whooping crane	<i>Grus americana</i>)	Experimental Population, Non-Essential
Birds	Bald eagle	<i>Haliaeetus leucocephalus</i>	Recovery
Birds	American peregrine falcon	<i>Falco peregrinus anatum</i>	Recovery
Birds	Southern white-tailed ptarmigan	<i>Lagopus leucura altipetens</i>	Resolved Taxon
Birds	Swainson's hawk	<i>Buteo swainsoni</i>	Resolved Taxon
Birds	Ferruginous hawk	<i>Buteo regalis</i>	Resolved Taxon
Birds	White-faced ibis	<i>Plegadis chihi</i>	Species of Concern
Birds	Western burrowing owl	<i>Athene cunicularia ssp. hypugaea</i>	Species of Concern
Birds	Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
Flowering Plants	Colorado Butterfly plant	<i>Gaura neomexicana var. coloradensis</i>	Recovery
Flowering Plants	Bell's Twinpod	<i>Physaria bellii</i>	Species of Concern
Flowering Plants	Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened
Flowering Plants	Western prairie fringed Orchid	<i>Platanthera praeclara</i>	Threatened

Type of Species	Common Name	Scientific Name	Status
Insects	Pawnee montane skipper	Hesperia leonardus montana	Threatened
Mammals	Swift fox	Vulpes velox	Resolved Taxon
Mammals	Black-tailed prairie dog	Cynomys ludovicianus	Resolved Taxon
Mammals	Gunnison's prairie dog	Cynomys gunnisoni	Resolved Taxon
Mammals	North American wolverine	Gulo gulo luscus	Resolved Taxon
Mammals	American pika	Ochotona princeps	Resolved Taxon
Mammals	Fringed myotis	Myotis thysanodes	Species of Concern
Mammals	Long-legged myotis	Myotis volans	Species of Concern
Mammals	Long-eared myotis	Myotis evotis	Species of Concern
Mammals	Preble's meadow jumping mouse	Zapus hudsonius preblei	Threatened
Mammals	Canada Lynx	Lynx canadensis	Threatened
Mammals	Little brown bat	Myotis lucifugus	Under Review
Reptiles	Eastern short-horned lizard	Phrynosoma douglassii brevirostra	Species of Concern

Source: U.S. Fish & Wildlife Service <https://ecos.fws.gov/ecp/>

Historic and Cultural Resources

Information about historic assets in Jefferson County came from local sources, as well as two historic inventories:

The National Register of Historic Places is the Nation’s official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

The Colorado State Register of Historic Properties is a listing of the state’s significant cultural resources worthy of preservation for the future education and enjoyment of Colorado’s residents and visitors. Properties listed in the Colorado State Register include individual buildings, structures, objects, districts, and historic and archaeological sites. The Colorado State Register program is administered by the Office of Archaeology and Historic Preservation within the Colorado Historical Society. Properties listed in the National Register of Historic Places are automatically placed in the Colorado State Register.

Table 4-9 lists the 113 properties and districts in Jefferson County that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties.

Table 4-9 Jefferson County Historic Properties in National & State Registers

Property Name	City	Register	Listed Date
Arvada Downtown	Arvada	National	7/15/1998
Arvada Flour Mill	Arvada	National	4/24/1975
Churches Ranch	Arvada	National	7/23/1998
Enterprise Grange No. 15	Arvada	State	8/11/1999
Ralston Cemetery	Arvada	State	6/30/2011
Ralston Gold Discovery Site (Gold Strike Park)	Arvada	State	12/13/1995
Reno Park Addition Historic District	Arvada	National	9/29/1999
Russell-Graves House	Arvada	National	5/9/1983

Property Name	City	Register	Listed Date
Seventh Day Adventist Church – Arvada Jaycee Hall	Arvada	State	2/24/2011
Stocke--Walter Addition Historic District	Arvada	National	9/24/1999
Silver Spruce Ranch	Bailey	State	6/12/1996
Blue Jay Inn	Buffalo Creek	National	10/1/1974
Green Mercantile Store	Buffalo Creek	National	10/1/1974
Green Mountain Ranch	Buffalo Creek	National	10/1/1974
La Hacienda	Buffalo Creek	National	7/20/1973
Bradford Junction	Conifer	State	1/23/2014
Conifer Junction Schoolhouse	Conifer	National	2/10/2014
Midway House	Conifer	National	9/18/1990
Pleasant Park School	Conifer	State	6/12/1996
Tower of Memories	Denver	National	9/25/1987
Bergen Park	Evergreen	National	11/15/1990
Bergen Park Church	Evergreen	State	6/1/2018
Brook Forest Inn	Evergreen	National	7/29/2009
Corwina Park, O'Fallon Park, Pence Park	Evergreen	National	12/28/1990
Dedisse Park	Evergreen	National	11/15/1990
Evergreen Conference District	Evergreen	National	5/1/1979
Everhardt Ranch	Evergreen	National	5/7/1980
Fillius Park	Evergreen	National	2/24/1995
Hiwan Homestead	Evergreen	National	4/9/1974
Humphrey House	Evergreen	National	12/31/1974
Ammunition Igloo	Golden	National	5/20/1993
Astor House Hotel	Golden	National	3/1/1973
Barnes--Peery House	Golden	National	10/12/2001
Calvary Episcopal Church	Golden	National	3/3/1995
Camp George West Historic District	Golden	National	2/11/1993
Colorado Amphitheater	Golden	National	5/20/1993
Colorado Midland Railway Observation Car No. 111	Golden	State	12/11/1996
Colorado National Guard Armory	Golden	National	12/18/1978
Colorow Point Park	Golden	National	11/15/1990
Coors, Herman, House	Golden	National	10/17/1997
Deaton Sculptured House	Golden	National	2/24/2004
Denver & Rio Grande Railroad Cars (13 entries)	Golden	State	various
Denver and Rio Grande Western Railroad Caboose No. 0578	Golden	National	11/4/2003
First Presbyterian Church of Golden--Unger House	Golden	National	3/14/1991
Genesee Park	Golden	National	11/15/1990
Golden Cemetery	Golden	National	4/18/2012
Golden High School	Golden	National	3/14/1997
Golden Welcome Arch	Golden	State	6/14/2000
Great Western Railway Combine No. 100	Golden	State	9/11/1996

Property Name	City	Register	Listed Date
Lariat Trail Scenic Mountain Drive	Golden	National	11/15/1990
Lookout Mountain Park	Golden	National	11/15/1990
Lorraine Lodge	Golden	National	1/18/1984
Loveland Building and Coors Building	Golden	National	5/16/1996
Magic Mountain Site	Golden	National	8/21/1980
Mount Vernon House	Golden	National	11/20/1970
Oscar Barber House	Golden	State	6/13/1994
Quaintance Block	Golden	National	3/25/1994
Queen of Heaven Orphanage Summer Camp	Golden	National	1/14/2000
Rio Grande Southern Railroad Cars (4 entries)	Golden	State	various
Rio Grande Southern Railroad Engine No. 20	Golden	National	12/14/2000
Rio Grande Southern Railroad, Motor No. 2	Golden	National	2/14/1997
Rio Grande Southern Railroad, Motor No. 6	Golden	National	2/19/1997
Rio Grande Southern Railroad, Motor No. 7	Golden	National	2/28/1997
Rockland Community Church and Cemetery	Golden	National	8/5/2009
Rocky Flats Plant	Golden	National	5/19/1997
Romano, Samuel and Albina, House	Golden	National	9/26/2016
Rooney Ranch	Golden	National	2/13/1975
Tallman Ranch	Golden	State	6/14/1995
Thiede Ranch	Golden	National	1/11/1996
Twelfth Street Historic Residential District	Golden	National	9/22/1983
Little Park	Idledale	National	2/24/1995
Starbuck Park	Idledale	National	6/30/1995
Indian Hills Community Hall & Firehouse	Indian Hills	State	5/14/1997
Bonfils-Stanton Belmar Estate Outbuildings	Lakewood	State	5/23/2013
Building 710, Defense Civil Preparedness Agency, Region 6 Operations Center	Lakewood	National	3/2/2000
Country Club Garden Apartments	Lakewood	State	8/27/2009
Davies' Chuck Wagon Diner	Lakewood	National	7/2/1997
Denver and Intermountain Railroad Interurban No. 25	Lakewood	National	1/12/2012
Hill Section, Golden Hill Cemetery	Lakewood	National	7/31/1995
Howell House	Lakewood	State	9/11/1996
Jewish Consumptives" Relief Society	Lakewood	National	6/26/1980
Office of Civil Defense Emergency Operations Center	Lakewood	National	12/16/1999
Peterson House	Lakewood	National	9/10/1981
Schnell Farm	Lakewood	National	2/14/1997
South Ranch	Lakewood	National	4/18/2003
Stone House	Lakewood	National	5/1/1975
Washington Heights School	Lakewood	State	6/13/1994
Bradford House II	Littleton	National	2/2/2001
Bradford-Perley House	Littleton	State	2/2/2015
Hildebrande Ranch	Littleton	National	3/13/1975

Property Name	City	Register	Listed Date
Shaffer, John C., Barn	Littleton	National	7/12/2019
Bear Creek Canyon Scenic Mountain Drive	Morrison	National	11/15/1990
Bradford House III Archeological Site	Morrison	National	4/8/1980
Bradford, Robert Boyles, Property	Morrison	National	2/2/2015
Craig, Katherine, Park	Morrison	National	6/30/1995
Dinosaur Ridge	Morrison	State	3/10/1993
District No. 17 – Medlen School	Morrison	State	4/14/2015
District No. 17 School--Medlen School	Morrison	National	4/14/2015
Fort, The	Morrison	National	7/14/2006
LoDaisKa Site	Morrison	National	9/25/2003
Morrison Historic District	Morrison	National	9/28/1976
Morrison Schoolhouse	Morrison	National	9/4/1974
Red Rocks Park District	Morrison	National	5/18/1990
Baehr Lodge / Baehr Den of the Rockies (Pine Valley Lodge)	Pine	State	6/10/1998
Staunton Ranch Rural Historic Landscape	Pine	National	12/4/2012
North Fork Historic District	Pine and South Platte	National	10/9/1974
North Fork Historic District (Boundary Increase)	Pine and South Platte	National	10/8/2008
Baugh, James H., House	Wheat Ridge	National	8/14/2012
Crown Hill Burial Park	Wheat Ridge	National	7/24/2008
Fruitdale Grade School	Wheat Ridge	National	3/20/2013
Pioneer Sod House	Wheat Ridge	National	3/14/1973
Richards Mansion	Wheat Ridge	National	9/15/1977
Wheat Ridge Post Office	Wheat Ridge	State	8/12/1992

Sources: National Register of Historic Places, <https://www.nps.gov/subjects/nationalregister/> and Colorado State Register of Historic Properties: <https://www.historycolorado.org/colorado-state-register-historic-properties>

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

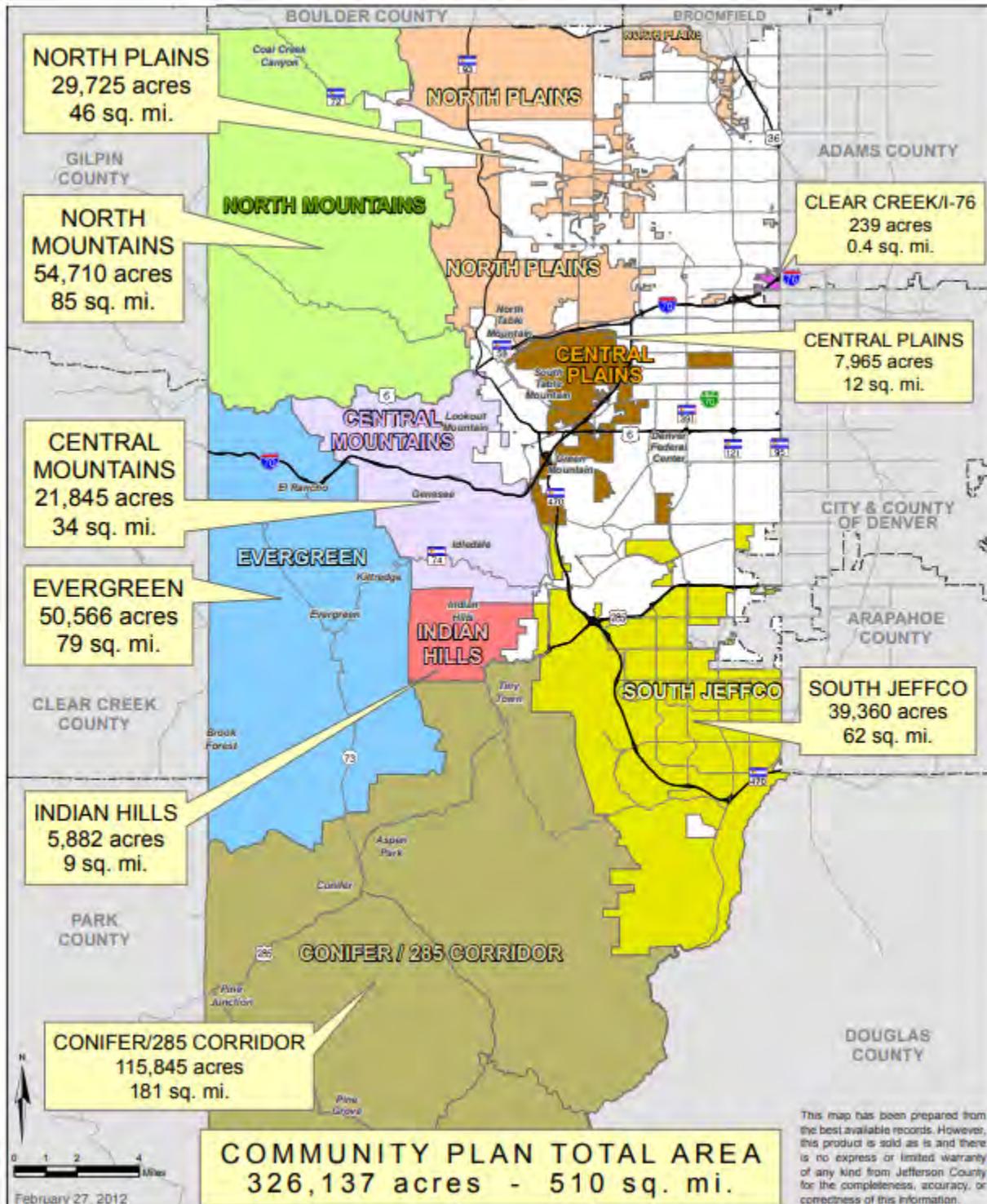
Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community 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. A list of the top employers in Jefferson County by number of employees can be found in Section 2.

4.2.4 Growth and Development Trends

A key strategy for reducing future losses in a community is to avoid development in known hazard areas while enforcing the development of safe structures in other areas. The purpose of this strategy is to keep people, businesses, and buildings out of harm's way before a hazard event occurs. The 2021 Jefferson County Hazard Mitigation Plan highlights areas where future development can be expected and areas

where mitigation options can be considered in future land use decisions to ensure safe, smart growth in the county.

Figure 4-3 Jefferson County Community Plan Areas



Source: Jefferson County, JEFFCO demographics, <https://www.jeffco.us/2394/Demographics>

Jefferson County has grown significantly in the past decade and is one of the fastest growing counties in the State. Between 2000 and 2019 Jefferson County's total population increased by 10.7% (DOLA 2021). The amount of growth that County has seen over the past twenty years has been dictated by the availability of undeveloped land. Based on observed population growth trends, housing demand within Jefferson County is expected to remain steady over the next decade.

Land use patterns and cover varies across the County. Approximately 40% of the land in unincorporated Jefferson County is protected by the Jefferson County Open Space Division (Jefferson County 2018). In addition to the Jefferson County Comprehensive Master Plan, which helps guide development in the County, there are also eight Area Plans (North Plains, Central Plains, South Plains, North Mountains, Central Mountains, Indian Hills, Evergreen Area and Conifer/285 Corridor Area) that provide land use recommendations for each of these unique areas in Jefferson County. While most of the total land area (72%) in County is located in the Mountains Areas, most development in the County between 2010 and 2018 has taken place in the South Plains Areas (Jefferson County 2019). **Figure 4-3** shows the location and general size of each Area Plan in the county.

4.3 Hazard Profiles

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

4.3.1 Profile Methodology

Each hazard is profiled in a similar format that is described below. It is important to note that the profiles are data driven, and that potential errors or omissions may exist in the data. In particular, there is a time variance between the different data sets. For example, winter storms have been tracked in the planning area for a longer period of time than swelling soils hazards have been documented, so the comparison of severity, previous occurrences, and rates of future occurrences between the two hazards is somewhat skewed. This variance exists between all known hazards in this plan. The information presented is for planning level assessments only.

Description

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

Geographic Extent

This subsection discusses how extensive the hazard is expected to be relative to Jefferson County. It may also include specific discussions regarding which areas of the County are most likely to be affected by the profiled hazard. An extent rating is assigned based on the following methodology:

- **Negligible:** Less than 10 percent of planning area or isolated single-point occurrences
- **Limited:** 10 to 25 percent of the planning area or limited single-point occurrences
- **Significant:** 25 to 75 percent of planning area or frequent single-point occurrences
- **Extensive:** 75 to 100 percent of planning area or consistent single-point occurrences

Percent of planning area is calculated by comparing the amount of area affected to the total county area: $(\text{affected acres}/\text{total county acres}) * 100 = \text{percent of affected planning area}$. Single point events, such as lightning, are evaluated for geographic extent by examining the density of the events collectively.

Previous Occurrences

This subsection contains an overview history of the hazard’s occurrences, compiled from multiple data sources. This includes information provided by the HMPC. Significant or historic incidents are profiled in greater detail and include scope, severity, and magnitude, and known impacts.

Probability of Future Occurrences

This subsection utilizes the frequency of past (known) events to calculate a probability of future occurrences. The likelihood is categorized into four different classifications:

- **Unlikely:** Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.
- **Occasional:** Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Likely:** Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years
- **Highly Likely:** Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.

Each hazard is calculated for a probability of future occurrence by comparing the known number of events to the available historic record: $(\# \text{ of known events}/\text{years on historic record}) * 100 = \text{Probability of Future Occurrence}$. Stated mathematically, the methodology for calculating the probability of future occurrences is:

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

This formula evaluates that the probability of a given hazard occurring in any given year in Jefferson County. The period of record will vary for each hazard and is based upon available data. In some instances, additional prediction methods are also measured by recurrence intervals, such as floods or hazards where the events occur more than once a year.

Magnitude and Severity

This subsection summarizes the anticipated magnitude and severity of a hazard event based largely on previous occurrences and specific aspects of risk as it relates to the planning area. Magnitude and Severity are classified in the following manner:

- **Negligible:** Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.
- **Limited:** 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.
- **Critical:** 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.
- **Catastrophic:** More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.

The rating is calculated by evaluating the event of record against these criteria. Since most events incur different levels of severity for each element, the rating is assigned to the classification with the most documented occurrences. The purpose of a magnitude and severity rating is to establish the highest known potential threshold of an event to help guide the mitigation goals and actions development. If there are significant events with much lower magnitude and severity ratings than the event of record, this discrepancy will be noted.

Climate Change Considerations

Climate includes patterns of temperature, precipitation, humidity, wind and seasons. Climate plays a fundamental role in shaping natural ecosystems, and the human economies and cultures that depend on them. "Climate change" refers to changes over a long period of time. It is generally perceived that climate change has had and will continue to have measurable impacts on the occurrence and severity of natural hazards around the world. Impacts include the following:

- Snow cover losses will continue, and declining snowpack will continue to affect snow-dependent water supplies and stream flow levels around the world.
- The risk of drought and the frequency, intensity, and duration of heat waves are expected to continue to increase.
- More extreme precipitation events will continue to be likely, increasing the risk of flooding.
- The Earth's average temperature is expected to continue to increase.

In 2018, the U.S. Global Change Research Program released the Fourth National Climate Assessment (NCA4), the authoritative and comprehensive report on climate change and its impacts in the United States. Not only did the report confirm that climate induced hazards continues to affect Americans in every region of the U.S., the report identifies increased heat, drought, insect outbreaks, wildfire, and flooding as key climate-related concerns for the Southwest region of the U.S., which includes Colorado. The following is a summary of climate change impacts from the Fourth National Climate Assessment.

Recent warming in the southwest region is among the most rapid in the nation and is significantly greater than the global average, and the period since 1950 has been hotter than any comparable long period in at least 600 years. Summer temperatures across the state are expected to warm more than winter temperatures and projections suggest that typical summer months will be as warm as (or warmer than) the hottest 10% of summers that occurred between 1950 and 1999. Under the higher emissions scenario (RCP8.5) climate models predict an increase of 8.6°F in the southwest regional annual average temperature by 2100.

Projected increases in temperatures in the southwest region are also projected to increase probabilities of natural events such as wildfires, drought, and extreme precipitation. These temperature changes have great potential to directly affect public health through increased risk of heat stress and infrastructure through increased risk of disruptions of electric power generation. Water supplies are also vulnerable to impacts of higher temperatures. While water supplies generally change year-to-year due to variabilities in water use and precipitation, higher temperatures are projected to increase evapotranspiration, reducing the effectiveness of precipitation in replenishing surface water and soil moisture. This will have direct impacts on crop yields and productivity of key regional crops and livestock a major risk for the agricultural industry and food security nationwide.

The impacts of climate induced hazards already pose a threat to people and property in the southwest region of the United States, including Jefferson County. Vulnerable populations, in particular those who are low-income, children, elderly, disabled and minorities will likely be impacted by the effects of climate induced hazards disproportionately than other populations (Refer to Section 2 for more information on social vulnerability in the county). Together, these impacts represent a slow-onset disaster that is likely to manifest and change over time. Current projections predict even more rapid changes in the near future, which are likely to affect many of the natural hazards that Jefferson County has historically dealt with. According to HMPC the County is already experiencing some hazards with more frequency and intensity than in years past, such as drought, flooding, wildfire and extreme heat.

Jefferson County's two most frequent and devastating hazards are wildfire and flood, both of which are expected to be impacted by our changing climate. The nature of erosion and public health hazards are also likely to evolve in intensity and character due to a changing regional climate. For these reasons, the hazard identification and risk assessment for the 2021 Jefferson County Hazard Mitigation Plan update includes climate change considerations discussion on how climate change may impact the frequency, intensity, and distribution of specific hazards within the county. Because many impacts of climate induced hazards cross county boundaries, some of the discussion looks at impacts on a regional scale. As climate science evolves, future mitigation plan updates may consider including climate change projections in the risk rankings and vulnerability assessments of the hazards included in the Plan.

Vulnerability Assessment

With Jefferson County's hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that the significant hazards would have on the County. The vulnerability assessment quantifies, to the extent feasible, assets at risk to natural hazards and estimates potential losses. This vulnerability assessment followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*, as well as Tasks 5 and 6 of the 2013 FEMA Local Mitigation Planning Handbook. The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard.

The vulnerability assessment was conducted based on the significance of the hazard utilizing best available data. This assessment is an attempt to quantify assets at risk, by jurisdiction where possible, to further define populations, buildings, and infrastructure at risk to natural hazards. The methods of analysis vary by hazard type and data available and are discussed further in 4.3.4 with each hazard analyzed. The information presented is for planning level assessments only. Avalanche is omitted from this vulnerability assessment due to the relatively low significance, lack of previous damages based on research, and a lack of data to support quantifying future losses. Data to support the vulnerability assessment was collected and compiled from the following sources:

- Current County and municipal GIS data (hazards, base layers, critical facilities and assessor's data)
- 2010 US Census, 2019 American Community Survey, and 2019 CO Department of Local Affairs (DOLA) data
- 2020 Homeland Infrastructure Foundation-Level Data (HIFLD) data
- Written descriptions of inventory and risks provided by participating jurisdictions;
- A refined flood loss estimation by jurisdiction with the use of geospatial analysis for both 1% and 0.2% annual chance flooding
- Updated modeling of earthquake loss potential with HAZUS-MH 2.2, including a 2,500 year probabilistic scenario and a hypothetical M 6.5 event on the Golden Fault

- Existing plans and studies, and applicable regulations
- Personal interviews with planning team members, hazard experts, and County and municipal staff.

The scope of the vulnerability assessment is to describe the risks to the County as a whole. The vulnerability assessment first describes the assets in Jefferson County, including the total exposure of people and property; critical facilities and infrastructure; natural, historic, and cultural resources; and economic assets. Development trends, including population growth and land status, are analyzed in relation to hazard-prone areas. Next, where data was available, hazards are evaluated in more detail and potential losses are estimated. Data from each jurisdiction was also evaluated and is integrated here but specific variations of risk are noted in the appropriate annex. The methods to assess vulnerability presented here include an updated analysis from the 2016 Jefferson County Multi-Hazard Mitigation Plan. This includes a detailed risk assessment for all hazards based on advanced methods and updated hazard and inventory data. Thus this 2021 plan should be considered the baseline for measuring changes in vulnerability during future updates, recognizing that vulnerability information should become more refined as data sources and methodologies improve over time. Examples of refinements and changes made in this plan include:

- Updated population and building inventory information, including most recent values and 2020 assessor data;
- An updated and more comprehensive inventory of critical facilities;
- An updated inventory of natural, historic, and cultural resources;
- A refined flood loss estimation by jurisdiction with the use of geospatial data provided by the Assessor's office and FEMA NFHL to perform GIS analysis for both 1% and 0.2% annual chance flooding, supplemented by local flood payers;
- Updated modeling of earthquake loss potential with HAZUS-MH 2.2, including a 2,500 year probabilistic scenario M7.25 and a hypothetical M 6.5 event on the Golden Fault;
- Detailed inventory by jurisdiction of potential structures and critical facilities at risk to hazards

Overall Hazard Significance

Overall potential impact of each hazard is summarized in this subsection, based on geographic extent, probability of future occurrences, and the magnitude and severity of the event of record. These ratings are averaged to provide an overall hazard significance rating, which is useful for comparing the hazards to one another and for guiding the development of actions and priorities. The overall hazard significance ratings are classified as follows:

- **Low:** Two or more of the criteria fall in the lower classifications, or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.
- **Medium:** The criteria fall mostly in the middle ranges of classifications, and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating.
- **High:** The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.

4.3.2 Avalanche

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 typically occur when loading of new snow increases stress to a snow covered slope at a rate faster than strength in the snowpack develops. 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), or animals.

According to the Colorado Avalanche Information Center (CAIC), about 98 percent of all avalanches start 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 also run on small slopes well below timberline, such as gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to steep slopes and prevent avalanches from starting; however, avalanches can release and travel through a moderately dense forest. An average-sized avalanche travels around 80 mph; the typical range of impact pressure from an avalanche is from 0.5 to 5.0 tons per square foot.

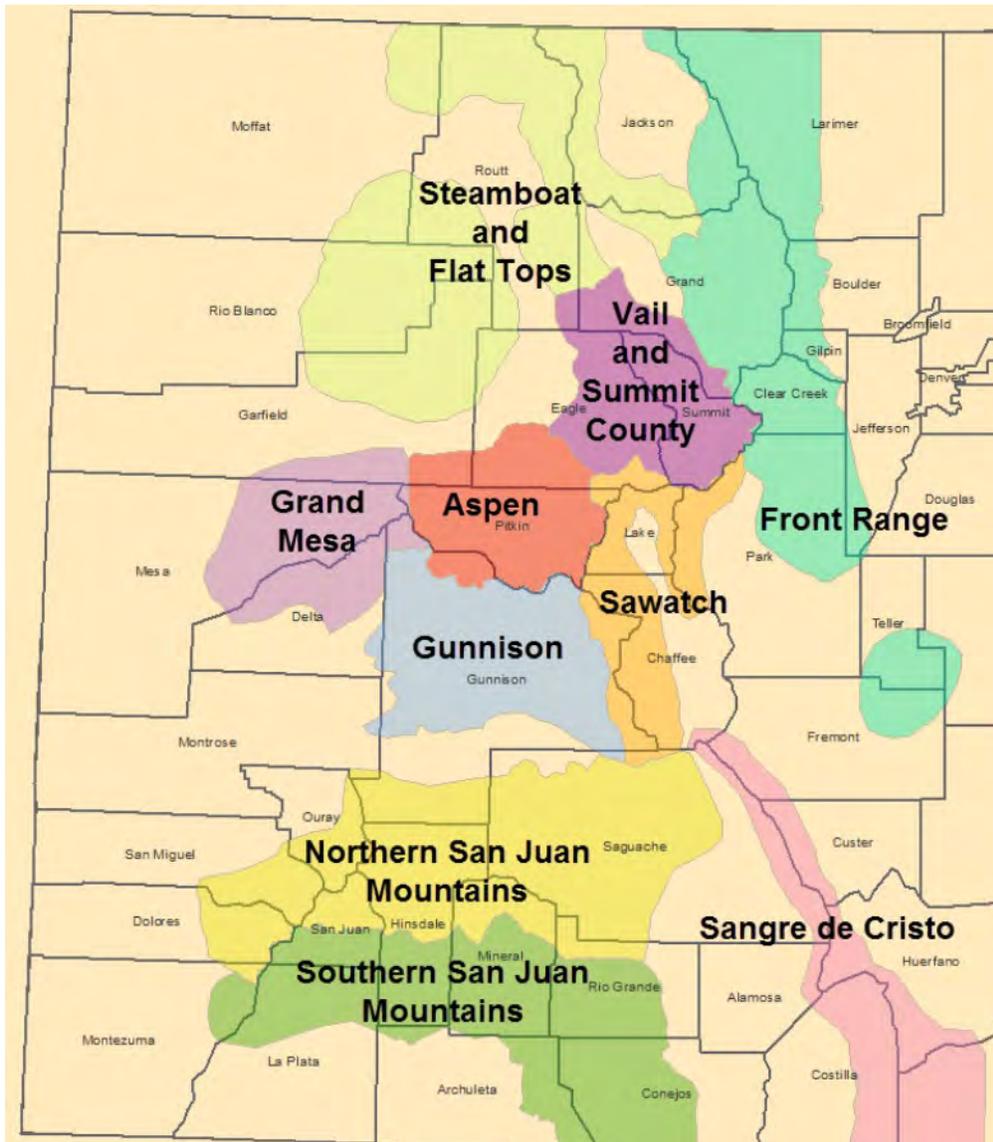
Avalanches in Colorado occur during the winter and spring, mainly between November and April. The most avalanche-prone months are February, March, and January. Avalanches caused by thaw occur most often in April. The avalanche danger increases with major snowstorms and periods of thaw followed by heavy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

Statistics and reporting from the CAIC indicate that between the winter of 1950/1951 and 2019/2020, Colorado suffered the highest number of avalanche fatalities (293) in the United States. On average over the past 10 winters, 27 people have died in avalanches in the United States each winter (CAIC 2020). This hazard generally affects climbers, backcountry skiers, snowmobilers, and skiers and snowboarders. A smaller number of motorists along highways are also at risk of injury and death due to avalanches, as are residents who live in avalanche-prone areas and other individuals working in those areas. Road and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches. Some residents may live in areas prone to avalanches and may be impacted directly if an avalanche occurs on their property, or indirectly if an avalanche limits or removes accessibility to the property, both for the resident(s) and for emergency response personnel. Recognizing areas prone to avalanches is critical in determining the nature and type of development allowed in a given area.

Geographic Extent

Avalanches typically occur above 8,000 feet and on slopes ranging between 25 and 50 degrees incline. The CAIC website provides backcountry forecasts for avalanche conditions for various forecast zones within the state, as depicted in Figure 4-4. The Front Range zone extends from the Wyoming border south, west to Loveland Pass, and includes the Pikes Peak Area. Almost all of Jefferson County falls outside of the zone boundaries. Only a small portion located just south of I-70, along the southeastern border of Clear Creek County, falls into the Front Range forecast zone. The Front Range zone extends from the Wyoming border south, west to Loveland Pass, and includes the Pikes Peak Area. Overall, this equates to far less than 10% of the planning area.

Figure 4-4 Colorado Avalanche Information Center Forecasts Zones



Source: Colorado Avalanche Information Center

There are few areas of the County where slopes are 30% higher. The majority of vulnerable area in the County lies west of the C-470 corridor, with isolated areas along North and South Table Mountains, the hogback formations and Green Mountain. Most of the areas east of the foothills have strict development restrictions, which minimizes the exposure of the population. In the mountainous areas, the greatest areas of potential occurrence which may impact developments lie along Highway 6, Bear Creek Canyon, Coal Creek Canyon, Ralston Creek Road, and Clear Creek Canyon. Not unexpectedly, these areas are also the areas with greatest potential for rock falls, landslides, or unstable slope events. However, while these areas demonstrate a slope with a known vulnerability to avalanches, the occurrence and tracking records indicate that the areas lack some other element that contributes to avalanche events, such as consistent snowpack.

Based on this information, the geographic extent rating for avalanches in Jefferson County is **negligible** or, at most, **limited**.

Previous Occurrences

The Colorado Avalanche Information Center (CAIC) database recorded 298 occurrences in the State of Colorado between late 1996 and January 2021. However, the database only captures accidents with unusual circumstances, fatalities, and injuries, and therefore represents only a fraction of occurrences.

According to the 2018 State Hazard Mitigation Plan, Jefferson County has had 4 avalanches that caused damage between 1960 and 2008, causing \$8,333 in damage. The HMPC could not find any additional details on these, likely due to the small amount of damage. There have been many more occurrences in neighboring Clear Creek County, which have indirect impacts on Jefferson County. Clear Creek County falls almost entirely in the Front Range forecast zone, with the western-most area falling into the Vail-Summit forecast zone. These zones are explained in the Geographic Extent section below. Impacts from avalanches as far away as Summit County can also impact Jefferson County. Avalanches along the I-70 corridor and US Highway 6 threaten transportation routes into Jefferson County from the Western Slope, and may threaten water supplies for downstream residents by jamming creeks, damaging dams, or destroying infrastructure. Several previous occurrences which indirectly impacted the planning area are recounted below, but none of them were within Jefferson County. These occurrences help establish the threat of secondary impacts of avalanches on Front Range counties.

March 23, 2003. The CAIC database recounts a very large avalanche just west of Silver Plume. The avalanche extended all the way down the mountain into Clear Creek and across I-70, spilling into the eastern lanes of the highway and damming the creek, which in turn threatened down-stream water supplies. The event was considered unusual because of its long run out in an area that normally is not avalanche prone.

December 30, 2007. The Channel 7 website reported that avalanche dangers and high winds closed all six lanes of I-70 stranding almost 2,000 travelers along the highway from Floyd Hill to Vail. Interviews with stranded travelers indicate a range of destinations, including the Denver International Airport, sporting events, and New Year's Eve celebration destinations, which underscores the economic impact of the danger on the entire state.

January 7, 2008. The Channel 7 website records avalanche mitigation efforts along I-70 halfway between the Eisenhower Tunnel and Silverthorne covered all six lanes of the highway and ranged from 6 to 10 feet deep. Other efforts closed down I-70 over Vail Pass and various other Colorado and U.S. highways across the western slope, heightening the dangers that avalanche conditions pose to travelers.

March 3 and 7, 2019. Media broadcasts reported avalanches on March 3rd and March 7th which swept across Interstate-70 in the Ten Mile Canyon between Frisco and Copper Mountain and trapped vehicles in several inches of avalanche debris. Fortunately, no injuries or property damages were reported but a large stretch of I-70 required closing down for several hours due to avalanche remediation work.

Probability of Future Occurrences

Jefferson County has only experienced four recorded avalanches in the past 60 years. This corresponds to a probability of future occurrences rating of **unlikely**.

Magnitude and Severity

According to the CAIC, there have been no reported deaths in Jefferson County due to avalanches between 1950 and 2014. Indirect impacts of avalanches on the planning area, such as economic losses due to road closures, are a matter of speculation rather than quantifiable data. With no reported damage amounts and no impact to the operation and delivery of critical services and functions it is difficult to consider the hazard very severe.

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. There is no record of damages for Jefferson County; therefore the magnitude and severity ratings for avalanches must remain **negligible** until additional information becomes available.

Climate Change Considerations

Climate change is likely to continue to alter the frequency and severity of avalanches in the future. In the last decade many experts in western states have pointed out increased avalanche risk associated with a changing snow, precipitation, accumulation, and overall warmer winter patterns. Snow may fall early in the winter and is then followed by a long period without snow. This creates a thin snowpack that becomes structurally weaker as winter goes on. New layers of snow may not bond well to the weak base layer, creating prime conditions for avalanches. Periods of sporadic snowfall in early and mid-spring in Colorado also contribute to this process of creating structurally weaker snowpack, which can lead to avalanche activity as snow accumulation has already begun to thaw with the warmer season. As Colorado experiences winters with higher average temperatures and lower average precipitation, these conditions that increase avalanche risk become more common. More intense and continuous storms over multiple days can also increase the potential for major avalanche cycles, as was experienced in March 2019.

Vulnerability Assessment

Due to limited available data, few recorded impacts, and the low significance rating, a detailed vulnerability assessment was not conducted for avalanche.

Overall Hazard Significance

Avalanches in Jefferson County do not have a significant impact on the planning area. In general, the impacts of avalanches for Jefferson County will be secondary. Avalanches in counties with a higher risk or vulnerability, such as Clear Creek County, may close roads and access points into Jefferson County or those counties may request mutual aid assistance to deal with the event occurrence. The geographic extent of the hazard is considered **negligible**. The probability of future occurrences is considered **unlikely** and the magnitude/severity for the event of record is **negligible**. In addition, the HMPC considers the hazard to have a **low** impact on the County. This equates to an overall impact rating of **low**.

4.3.3 Dam Failure/Incidents

Description

Dams are human-built 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
- 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

Dam failure occurs when the retention function of the dam is compromised, in part or in its entirety. Damage to a dam structure that may result in a failure may be caused by many sources. Possible damages include poor maintenance, age, animal incursion (particularly in earthen dams), erosion, and damages sustained as a result of seismological activity. A dam failure is not the only type of emergency associated with dams. Spillway discharges that are large enough to cause flooding in downstream areas or flooding upstream of dams due to backwater effects or high pool levels are both considered dam emergencies and may cause significant property damage and loss of life (USACE 1980).

Dam failures result in a unique source of flash flooding, when a large amount of previously detained water is suddenly released into a previously dry area due to a failure in some way of the dam. Dams are classified into four classes. The U.S. Army Corps of Engineers and the Colorado State Engineer classify dams into four categories based on the potential consequences should the dam fail:

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

It is important to keep in mind that the hazard classification of a dam is a measure of the consequences if the dam were to fail, not a measure of how likely the dam is to fail.

Privately owned High and Significant hazard potential dams are required by Colorado regulations to have Emergency Action Plans (EAPs) in place. Class I dams are required to have inundation maps as well. Federally owned High hazard dams are also required to have EAPs by Federal Regulations (USACE). According to the 2018 State Hazard Mitigation Plan, all high-hazard dams in Colorado have EAPs in place, which provide for the emergency response procedures in the event of a dam emergency event.

Dam inundation can also occur from non-failure events or incidents such as when outlet releases increase during periods of heavy rains or high inflows. Controlled releases to allow water to escape when a reservoir is overfilling can help prevent future overtopping or failure. When outlet releases are not enough, spillways are designed to allow excess water to exit the reservoir and prevent overtopping. This can protect the dam but result in flooding downstream.

A low head dam is an engineered structure built into and across stream and river channels. Low head dams were historically built for a variety of purposes to support industrial, municipal, and agricultural

water usage through the diversion of water from streams. Low head dams have also been built to provide recreational amenities for boating, rafting and tubing as well as improve aquatic habitats (Colorado DNR). Water flows over the dams creating a recirculating current that can trap unknowing river users. Due to the low height of this type of dam, low head dams can be difficult to see by river users that are not aware of them and because of the tranquil pool that gives the appearance there is no danger. There are 49 identified low head dams located on the South Platte River, Clear Creek and Ralston Creek in Jefferson County. These low head dams in the County are used as diversion, grade control structures and for recreation purposes. The low head dams along each stream in the County are summarized in Table 4-10 and mapped in Figure 4-8.

Table 4-10 Low Head Dams in Jefferson County

Stream Name	Low Head Dam Category	Count
South Platte River	Grade Control Structure	3
	Diversion Dam	1
Clear Creek	Grade Control Structure	15
	Diversion Dam	16
	Recreation	1
Ralston Creek	Grade Control Structure	9
	Diversion Dam	4

Source: Colorado Department of Natural Resources, Dam Safety Branch

Levees are defined by the Army Corps of Engineers as “earthen embankments whose primary purpose is to furnish flood protection from seasonal high water for a few days or weeks a year. Levees are broadly classified as either urban or agricultural because of different requirements from each” (USACE 2007). Riverine levees are those built to protect from flooding of river ways, whereas coastal levees are those built to protect from coastal water flooding. Levee failures can occur when a flood occurs that exceeds the designed level of protection. In this case the levee may fail or be overtopped. Levees that are not maintained are at risk from failure due to erosion, rodent activity, or piping along roots from vegetation growing on the levee. According to the U.S. Army Corp of Engineers (USACE) and FEMA National Levee Database there are no levees in Jefferson County.

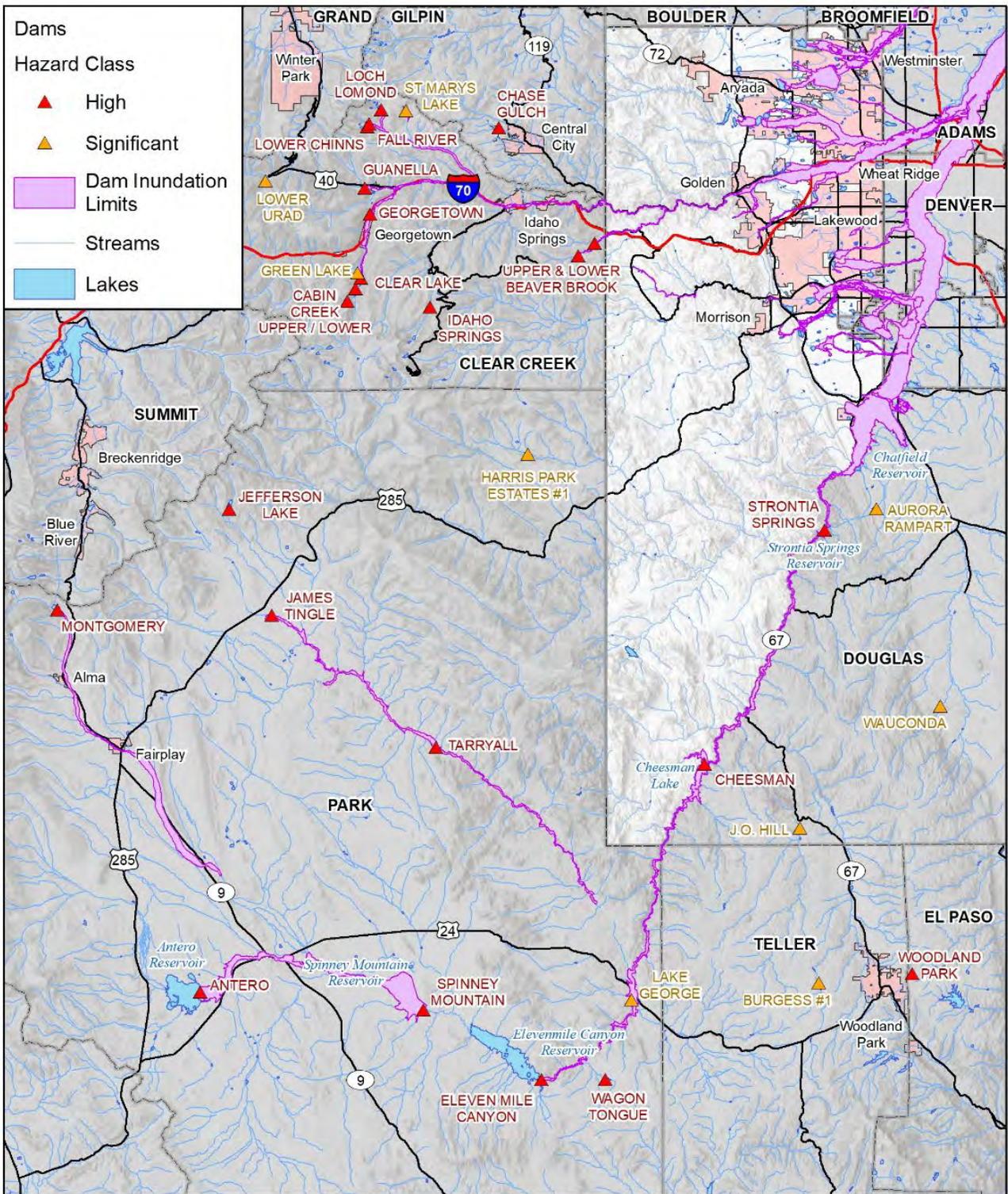
Geographic Extent

Jefferson County contains 30 high hazard, 11 significant hazard and 70 low hazard dams. In addition, one high hazard dam and two low hazard dams have been identified as potentially impacting areas of Jefferson County if breached. Dams outside the county along the in the South Platte River watershed to the south would impact the southern, unincorporated areas of Jefferson County; dams located to the north would affect the more-populated jurisdictions along Clear Creek.

This data indicates that a large portion of the County and County population centers, certainly more than 25%, are exposed to potential dam failures. For example, in a failure of both the Ralston Reservoir Dam and Blunn Dam at Arvada Reservoir, almost 5% of the County would be impacted. Based on this information, the geographic extent rating for dam failure is **significant**.

Table 4-11 lists the high and significant hazard dams within Jefferson County. Dam Names with an asterisk (*) next to them have been given a conditionally satisfactory or unsatisfactory rating by the State Engineer, meaning they have storage restrictions due to structural concerns. As of February 2021, 33 dams in Jefferson County were given the conditionally satisfactory or unsatisfactory ratings. While 23 of these are low hazard dams, 2 are rated significant hazard and 8 are rated high hazard.

Figure 4-5 High and Significant Hazard Dams with Potential to Impact Jefferson County



Map compiled 3/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety

0 5 10 Miles



Figure 4-6 shows where the high and significant hazard dams are located. Table 4-12 lists the high and significant hazard dams that are located outside the County, but whose failure could have impacts inside the County. These regional dams are presented in Figure 4-5.

Table 4-11 High and Significant Hazard Dams in Jefferson County

Dam Name	Stream	Downstream Community	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Bear Creek	Bear Creek	Lakewood	2,000	Yes	High
Bergen East	Weaver Gulch	Morrison	706	Yes	High
Blunn	Ralston Creek	Arvada	6,361	Yes	High
Chatfield	South Platte River	Littleton	26,600	Yes	High
Cheesman	South Platte River	Deckers	79,064	Yes	High
East	Weir Gulch	Lakewood	102	Yes	High
Evergreen*	Bear Creek	Evergreen	669	Yes	High
Fairmount Reservoir	Clear Creek	Wheat Ridge	981	Yes	High
Fortune	Big Dry Creek	Westminster	9,800	Yes	High
Genesee No. 2			101	Yes	High
Harriman	Weaver Creek	Lakewood	762	Yes	High
Hyatt*	Van Bibber Creek	Arvada	760	Yes	High
Ketner	Walnut Creek	Westminster	166	Yes	High
Leyden	Leyden Creek	Arvada	90	Yes	High
Lookout Mountain	Clear Creek	Golden	101	Yes	High
Lower Long Lake*	Ralston Creek	Arvada	292	Yes	High
Magic Mountain #1	Jackson Gulch	Pleasant View	145	Yes	High
Main	Weir Gulch	Lakewood	583	Yes	High
Maple Grove	Lena Gulch	Lakewood	1,123	Yes	High
Morrison Raw Water	Bear Creek	Morrison	29	Yes	High
Polly A. Deane*	Dutch Creek	Littleton	512	Yes	High
Ralston	Ralston Creek	Arvada	10,749	Yes	High
Smith*	Bear Creek	Lakewood	638	Yes	High
Standley Lake	Big Dry Creek	Westminster	43,344	Yes	High
Strontia Springs	South Platte River	Kassler	7,700	Yes	High
Tucker Lake - North Dam	Ralston Creek	Arvada	586	Yes	High
Tucker Lake - South Dam	Ralston Creek	Arvada	882	Yes	High
Upper Long Lake*	Ralston Creek	Arvada	1,500	Yes	High
Wellington*	S. Fork Buffalo Creek	Buffalo Creek	4,399	Yes	High
Willow Springs #1*	Turkey Creek	Lakewood	108	Yes	High
Woman Creek	Woman Creek	Westminster	836	Yes	High
Beers Sisters Lake	S. Platte River	Littleton	39	Yes	Significant
Bergen West*	Weaver Gulch	Lakewood	370	Yes	Significant
Bowles #1	South Platte River	Bowmar	2,475	Yes	Significant
Carmody	Sanderson Gulch	Lakewood	22	Yes	Significant

Dam Name	Stream	Downstream Community	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Devinney	S. Lakewood Gulch	Lakewood	10	Yes	Significant
Harwood S Storage Reservoir	Weaver Gulch	Lakewood	143	Yes	Significant
Johnston	Lilley Gulch	Littleton	547	Yes	Significant
Kendrick	Sanderson Gulch	Lakewood	242	Yes	Significant
Lockport	Troublesome Creek	Kittredge	36	Yes	Significant
Meadow View	North Turkey Creek		51	No	Significant
Pomona No. 2 And No. 3*	Little Dry Creek	Arvada	114	Yes	Significant

Source: National Inventory of Dams, NHD

Note: * represents dams that have been rated as unsatisfactory or conditionally satisfactory by the State Engineer

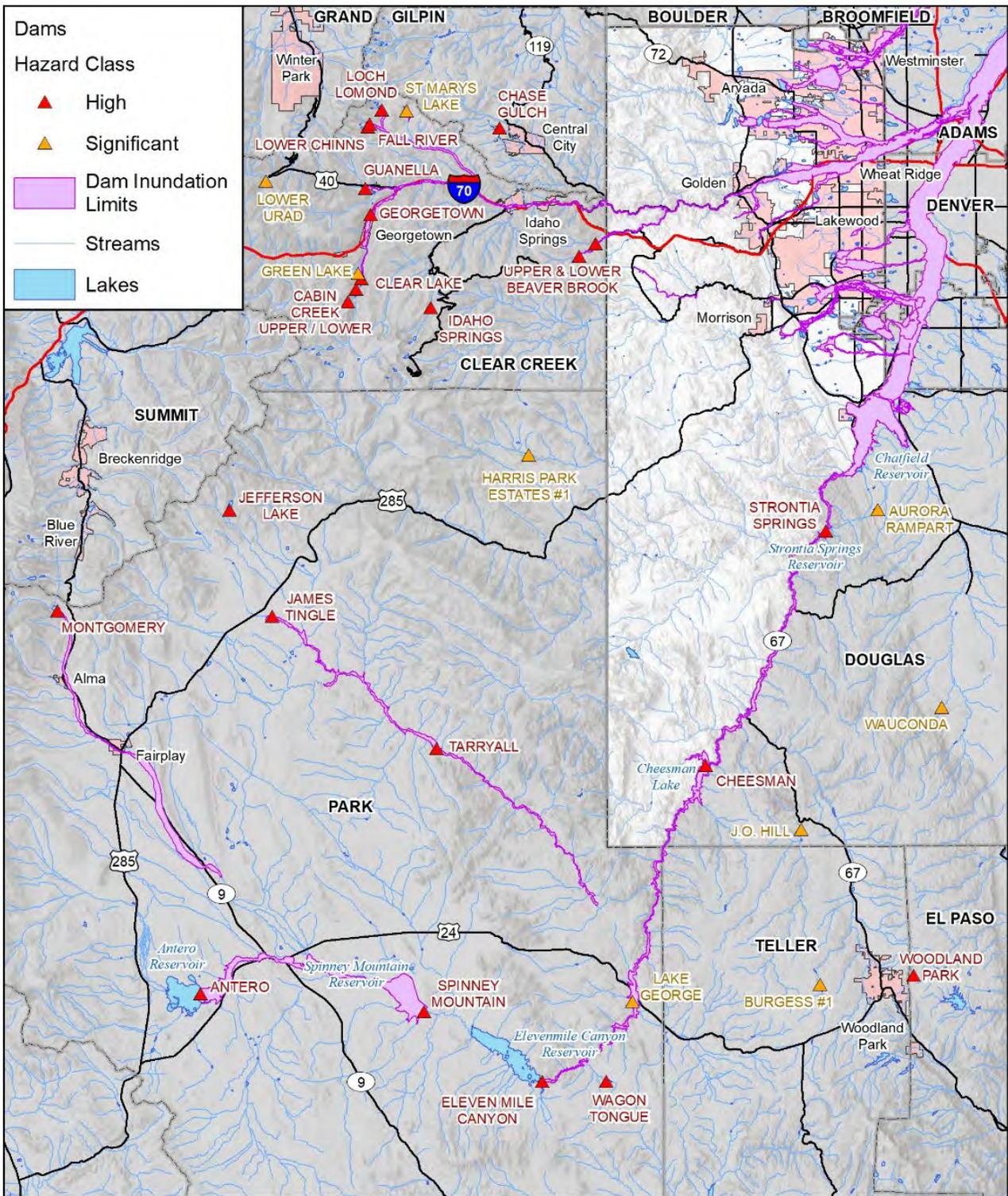
Table 4-12 Other High and Significant Hazard Dams That May Impact Jefferson County

Dam Name	Stream	Downstream City	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Lower Beaver Brook	Beaver Brook	Golden	30	Yes	High
Upper Beaver Brook	Beaver Brook	Golden	397	Yes	High
Upper Cabin Creek	South Clear Creek	Georgetown	1,602	Yes	High
Lower Cabin Creek	South Clear Creek	Georgetown	1,988	Yes	High
Idaho Springs	Chicago Creek	Idaho Springs	230	Yes	High
Lower Chinns	Fall River	Idaho Springs	108	Yes	High
Clear Lake	South Clear Creek	Georgetown	703	Yes	High
Fall River	Fall River	Idaho Springs	890	Yes	High
Georgetown	South Clear Creek	Lawson	386	Yes	High
Loch Lomond	Fall River	Idaho Springs	875	Yes	High
Chase Gulch	Chase Gulch	Black Hawk	602	Yes	High
Guanella	West Fork Of Clear Creek	Empire	1,340	Yes	High
Woodland Park	Loy Gulch	Woodland Park	60	Yes	High
Antero	S. Fork S. Platte River	Hartsel	44,733	Yes	High
Eleven Mile Canyon	South Platte River	Lake George	97,800	Yes	High
Jefferson Lake	Jefferson Creek	Jefferson	2,560	Yes	High
Montgomery	Middle Fork S. Platte	Alma	5,088	Yes	High
Tarryall	Tarryall Creek	Deckers	1,963	Yes	High
Wagon Tongue	Wagon Tongue Gulch	Lake George	130	Yes	High
Spinney Mountain	South Platte River	Lake George	53,873	Yes	High
James Tingle	Michigan Creek	Jefferson	400	Yes	High
Green Lake	South Clear Creek	Georgetown	96	Yes	Significant
St. Marys Lake	Silver Creek	Idaho Springs	38	Yes	Significant
Lower Urad	Woods Creek	Empire	252	Yes	Significant
Aurora-Rampart	Willow Creek	Kassler	1,200	Yes	Significant

Dam Name	Stream	Downstream City	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
J. O. Hill	West Creek	Deckers	154	Yes	Significant
Wauconda	Bear Creek	Sedalia	336	Yes	Significant
Burgess #1	Rule Creek	Deckers	210	Yes	Significant
Lake George	S. Platte River	Lake George	270	Yes	Significant
Harris Park Estates #1	Elk Creek	Shaffers Crossing	101	Yes	Significant

Source: National Inventory of Dams, NHD

Figure 4-5 High and Significant Hazard Dams with Potential to Impact Jefferson County

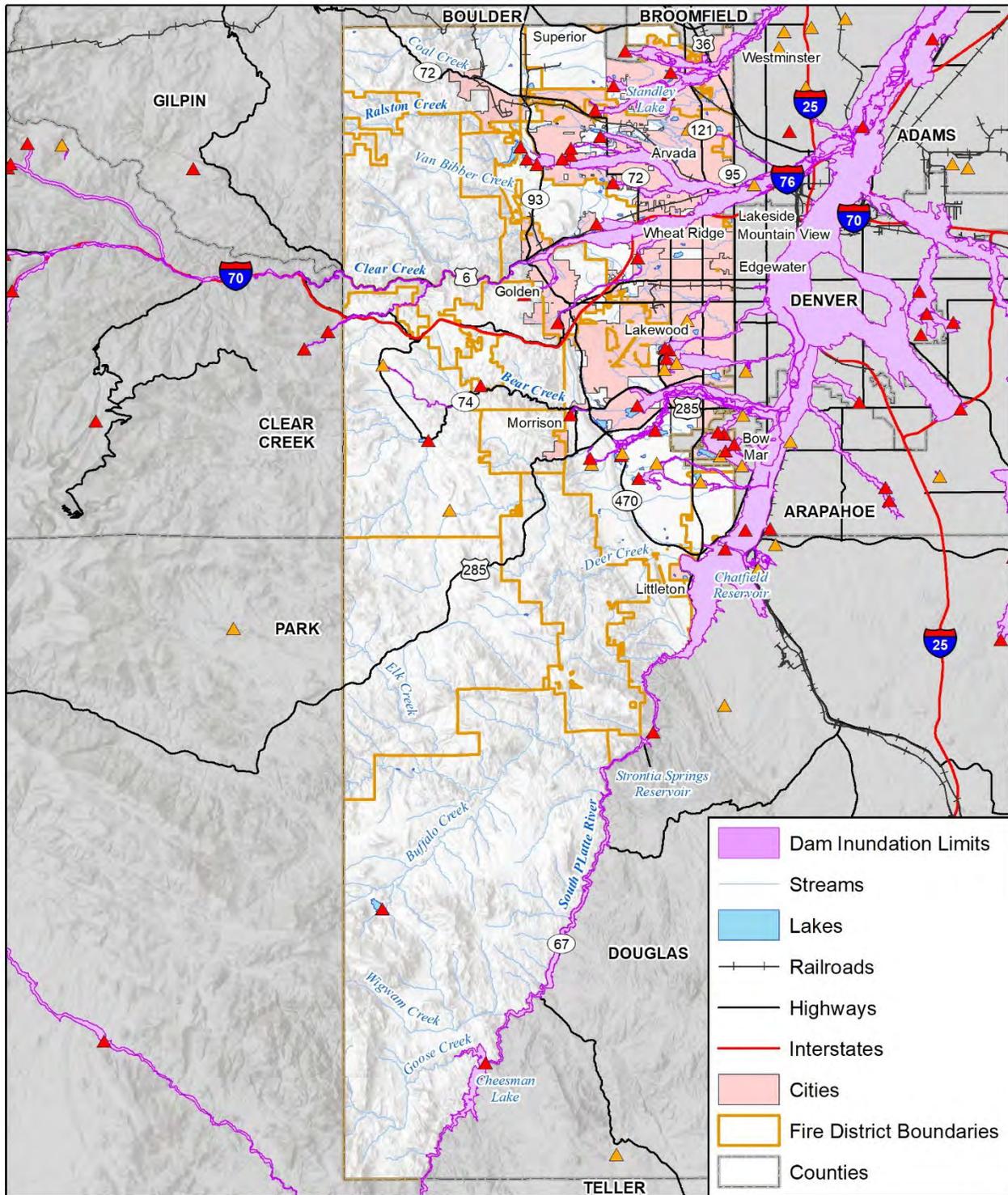


Map compiled 3/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety

0 5 10 Miles



Figure 4-6 Potential Dam Inundation Areas

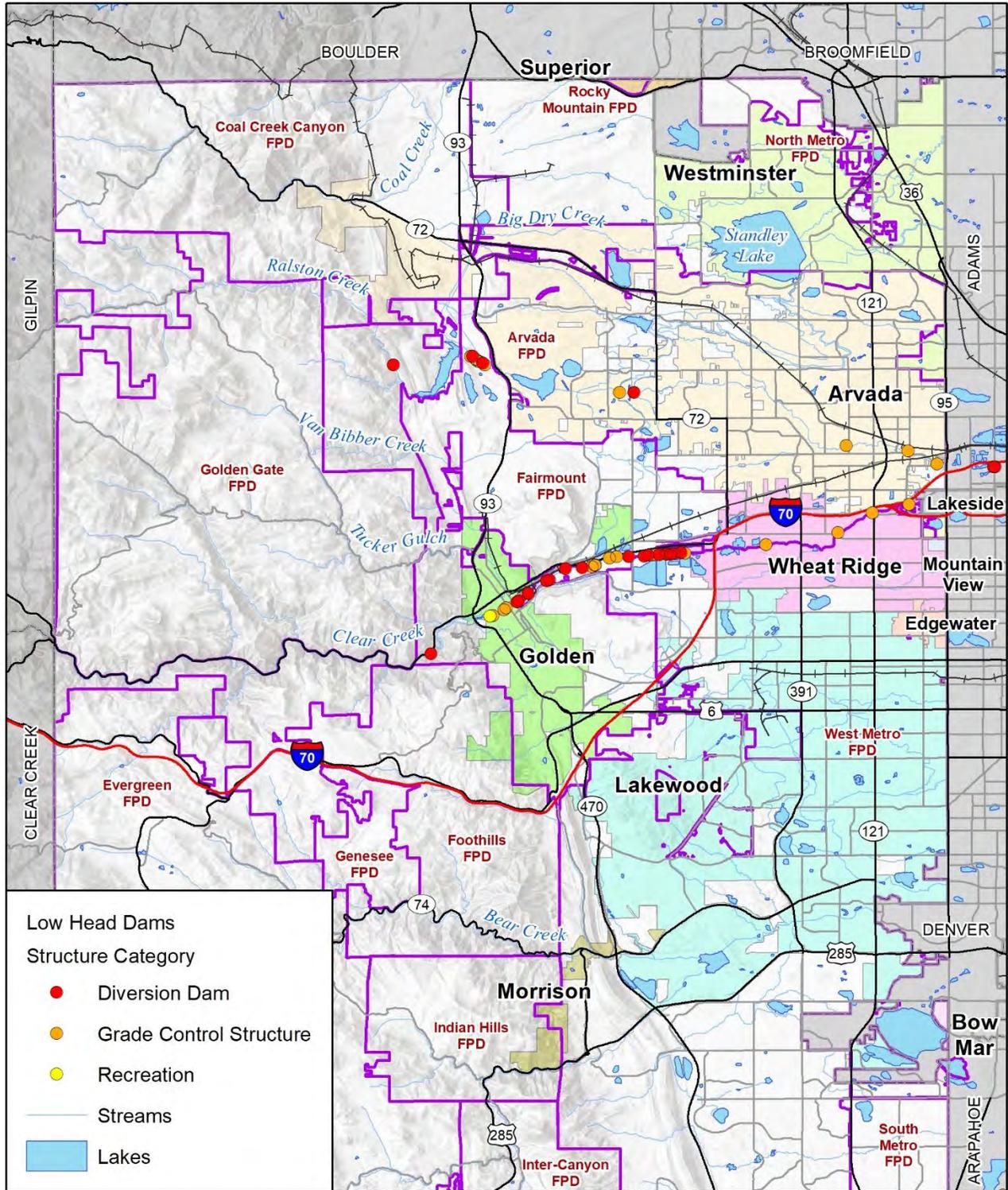


wood Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety, EAP

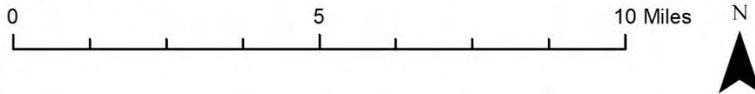
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Figure 4-8 Low Head Dams in Jefferson County



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado Dept. of Natural Resources



Non-Failure Dam Incidents:

The Colorado DNR has a statewide database that identifies the potential for non-failure dam inundation to show potential areas of flooding where outlet capacity exceeds the downstream channel capacity. The dams at the highest risk of non-failure inundation are shown in Table 4-13. The ranking shown in the table represents the likelihood of hazardous conditions existing below the dams during a worst case, maximum outlet release scenario. Dams are ranked as high, moderate, or low likelihood for outlet releases to cause conditions that could require an emergency response to reduce potential downstream consequences. The ranking is based on a statewide database of high hazard dams that includes 441 high hazard dams that have been analyzed by the Colorado DNR for this aspect of dam incident flooding. The high, moderate, or low designations were assigned by DNR by dividing the total number of ranked dams across the state into thirds. Should there be a need to relieve pressure on the dam (e.g. if there was excess inflow from high rains or snowmelt) releases from the dams ranked as high or moderate may result in downstream flooding.

Table 4-13 Dam with Risk of Non-Failure Inundation

Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
090112	Bear Creek	7 FT X 10.5 FT*	2,000	3	High
070302	Blunn	48" RCP	420	6	High
080324	Chatfield	2-10' X 15.5' *	8,300	4	High
800102	Cheesman	78" steel + upper level tunnel	2,382	137	High
090111	Evergreen	12" steel pipe	425	30	High
090240	Genesee No. 2	DIP with multi-level intake	22	119	High
070209	Leyden	36" CIP	193	23	High
070214	Magic Mountain #1	30" CMP w/ 24-INCH HDPE LINING	67	123	High
070219	Maple Grove	30" STEEL	102	2	High
070224	Ralston	60" STEEL	650	8	High
020326	Standley Lake	new outlet constructed 2004, 2 - 72" dia steel intake pipes, 102" tunnel along toe	700	7	High
080401	Strontia Springs	2-48",2-18",2-*	4,000	59	High
020633	Woman Creek	30" STEEL & RCP	75	62	High
090104	Bergen East	12" CIP	45	157	Moderate
020635	Fortune	30 inch steel pipe encased in concrete	107	189	Moderate
020226	Ketner	12" CMP w/ insituform liner	6	210	Moderate
090208	Morrison Raw Water	8" D.I.P.	4	207	Moderate
090131	Polly A. Deane	18" RCP	25	216	Moderate
075311	Smith	12" CIP; installed in 1940	12	228	Moderate
070232	Tucker Lake - South Dam	2- 15" RCP	34	246	Moderate
800116	Wellington	6'W X 8'H rock tunnel	162	161	Moderate
075309	East	18" RCP	22	280	Low
070312	Fairmount Reservoir	24" DIP	30	309	Low
090115	Harriman	37" Steel	63	323	Low

Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
070136	Hyatt	8"&10" PVC, sliplined old pipes	18	296	Low
070104	Lookout Mountain	2-8" DIP	5	343	Low
070115	Lower Long Lake	12" CIP	18	341	Low
075310	Main	20" CIP	32	284	Low
070320	Tucker Lake - North Dam	12" RCP	0	348	Low
070114	Upper Long Lake	18" CIP	61	367	Low
090204	Willow Springs #1	6" steel	2	358	Low

Source: State of Colorado Department of Natural Resources, Dam Safety

Previous Occurrences

While there are numerous dams in and around Jefferson County, there have only been thirteen incidents reported to the National Performance of Dams database, three of which were failures. Those incidents are recorded in Table 4-14. Specifics related to these dam failures are not available, but a brief profile of the anticipated impacts for dam failures for the high hazard dams, based on the contents of the dam emergency action plans (EAP) is discussed.

Table 4-14 Jefferson County Dam Failures and Incidents

Date	Dam Name	Waterway	Nearest Town	Dam Hazard Potential	Event	Failure?
1952	Clear Lake ¹	Clear Creek	Georgetown	Significant	Inflow flood-hydrologic event	Yes
1974	Oberon Lake No. 1	Ralston Creek	Arvada	Significant	Inflow flood-hydrologic event	Yes
February 1979	Maple Grove	Lena Gulch	Lakewood, Wheat Ridge	High	Vandalism	Yes
January 1993	Standley Lake	Big Dry Creek	Westminster	High	Reservoir-Wind Waves	No
April 1998	Fairmount	Clear Creek	Wheat Ridge	High	Reservoir Incident	No
June 5, 2013	Montgomery ²	Middle Fork S. Platte	Unincorporated County	High	Seepage/Internal Erosion	No
Sept. 12, 2013	Chase Gulch ²	S. Platte	Golden	High	Seepage/Internal Erosion	No
Sept. 12, 2013	Leyden	Chase Gulch	Arvada	High	Hydrologic/flooding	No
Sept. 13, 2013	Tucker Lake – South Dam	S. Platte River	Arvada	High	Hydrologic/flooding – High Reservoir Level	No
May 22, 2015	Strontia Springs	S. Platte River	Littleton	High	High Reservoir Level	No
June 16, 2015	Eleven Mile Canyon ²	S. Platte	Unincorporated County	High	Hydrologic/flooding – High Reservoir Level	No
June 17, 2015	Cheesman	S. Platte River	Unincorporated County	High	Hydrologic/flooding – High Reservoir Level	No

Date	Dam Name	Waterway	Nearest Town	Dam Hazard Potential	Event	Failure?
June 22, 2017	Jefferson Lake ²	Jefferson Creek	Unincorporated County	High	Seepage/Internal Erosion – Excessive/increased Seepage	No

Source: National Performance of Dams database, Stanford University and Association of State Dam Safety Officials Dam Incident Database ¹This dam is located in Clear Creek County, but the dam failure affected the City of Golden in Jefferson County

² These dams are located outside of Jefferson County but have the potential to impact the County.

2013 Flooding Event: In September 2013, Jefferson County and the entire Front Range experienced heavy rainfall over an eight-day period from the 11th to the 18th. The rainfall caused many dam spillways to flow in Jefferson County and the surrounding area. The dam spillway overflows mitigated structural damage to the dam but was cause for concern for some downstream communities not used to seeing spillways full of water. There was also concern that spillway flows and outlet discharges could cause flooding downstream. Per a CBS Denver report, residents living near Leyden Dam in Arvada were voluntarily evacuated on September 12th, 2013. While there was no fear of the dam failure, concern was centered around excess runoff from the spillway creating dangerous flooding on roadways. The event caused damage to Indiana Street that caused the road to be closed for several weeks for repairs. According to the Urban Drainage and Flood Control District “*A September to Remember*” document the flooding exposed an 18-inch water main encased in a 36-inch concrete pipe, overtopped the upstream embankment of the Croke Canal, and resulted in shallow flooding of several homes and businesses along Leyden Creek. The document also suggests that dam improvements in 2001 likely averted a catastrophic dam failure, which would have caused severe property damage and likely cost lives.

Ralston Reservoir is owned by Denver Water and is a water supply reservoir on Ralston Creek west of Arvada. Because it has no flood storage it released water over its emergency spillway on September 12, 2013, causing significant erosion on a steep hillside near Highway 93. The spillway discharge added to the downstream watershed contribution, causing substantial channel and erosion damage before reaching Arvada/Blunn Reservoir.

For the most part, communities in Jefferson County had seen substantial investment in dam improvements prior to the 2013 floods, which paid off when the storm and its impacts arrived. Pat Dougherty, Arvada City Engineer was quoted in “*A September to Remember*” as saying “the story is that there is no story, because the story is what we did over the years to prevent flood damages.” Bear Creek Reservoir was constructed to protect Lakewood and Denver from flooding. A significant amount of water was impounded during 2013 and 2015 flood events. While this caused some damage to the City of Lakewood’s park facilities it likely prevented flood damage to residents and businesses downstream.

Non-jurisdictional dams or impoundments did not fare so well. These are low hazard dams that are not inspected by the State Engineer. At least two of these structures breached, both located west of Highway 93 near Leyden. One of these created severe erosion that was visible from the highway.

Probability of Future Occurrences

There have been 13 dam incidents in Jefferson County since 1890. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a dam failure occurring in any given year is 6%. This corresponds to a probability of future occurrences rating of **occasional**.

Magnitude and Severity

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. There is no event of record for Jefferson County with a sufficiently detailed profile that allows for a specific discussion on the severity and magnitude of such an event. However, the rating systems utilized in dam classification is a useful measurement for assessing the

potential magnitude and severity of a dam failure. In addition, all high-hazard dams in Colorado are required to have Emergency Action Plans (EAPs) that include predicted inundation maps for dam failure scenarios. These tools allow planners to measure the estimated worst-case or event-of-record occurrences for a dam failure.

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 (downstream). The largest four dams in terms of maximum storage are the Cheesman (79,064), Standley Lake (43,344), Chatfield (26,600), and the Ralston Dams (10,749). Chatfield and Cheesman Dams both are located on the South Platte River and a failure to either could be catastrophic for Jefferson County. A failure of the Chatfield Dam would impact the City of Littleton but would also affect unincorporated areas of the County. Unincorporated areas of the County, specifically Deckers, would also be impacted if Cheesman Dam were to fail. Failure of the Standley Lake Dam would affect Westminster and the Ralston Dam would have the greatest impact on the City of Arvada if it were to fail.

Police stations, fire stations, or health care facilities are located directly in the inundation areas, they would be indirectly impacted by the event, which would not only overwhelm local emergency response capabilities (who would be entirely consumed in the evacuation process and require additional assistance from neighboring counties to assist in both the evacuation and routine calls), but hinder response activities through the direct impacts on roads, bridges and railways.

Potential injuries caused by a failure are considered numerous and severe, and the high-hazard rating placed on the dam indicates that human fatalities are anticipated during a failure. The medical response of the County would be severely impacted or overwhelmed, though nearby jurisdictions are anticipated to help. However, the dam break would also impact Denver, Adams, and Weld Counties directly, which would stretch support resources even thinner. Based on these factors, the magnitude severity ratings for dam failure are considered **critical** and perhaps even **catastrophic**.

Climate Change Considerations

The potential for climate change to affect the likelihood of dam failure has been incorporated into the 2020 Rules and Regulations for Dam Safety and Dam Construction. The climate-change related Rule is based on a state-of-the-practice regional extreme precipitation study completed in 2018 (DWR, 2018). This study determined a very high likelihood of temperature increases, resulting in increased moisture availability to extreme storms. As such, an atmospheric moisture factor of 7% is required to be added to estimates of extreme rainfall for spillway design.

Vulnerability Analysis

The impacts of a dam failure to existing development in Jefferson County could be catastrophic. Specific inundation maps and risk information are included in the dam-specific emergency action plans housed the Jefferson County Office of Emergency Management. The estimated impacts to property within the County and its municipalities from a dam failure are discussed in this vulnerability analysis. However, dam failures would potentially result in a much greater loss of life and more extensive destruction to property and infrastructure due to the potential speed of onset; greater depth, extent, and velocity of flooding; and the wider damage areas caused by the ability of dam failures to flood areas outside of mapped floodplains. For reference, high hazard dams threaten lives and property, significant hazard dams threaten property only.

In general, communities located below a dam and along a waterway are likely to be exposed to the impacts of a dam failure. The reservoirs located in the foothills and Rocky Mountains have the greatest potential impacts; this includes reservoirs located in the planning area, and reservoirs that may be located outside and upstream of the planning area but could still have impacts in Jefferson County. The dams within the planning area include the large reservoirs of Arvada, Ralston, and Standley Lake. Bear Creek Dam is primarily a flood control dam. Antero, Chatfield, Cheesman, Eleven Mile, Strontia Springs, Marston Lake, and Spinney Lake are mostly outside of the planning area on the South Platte River. The South Platte River is also the southeast border of Jefferson County. Impacts in the South Platter River Canyon could be severe if any of these dams failed, but fortunately most of this area is sparsely developed. The impacts of any of these dam failures would be great in the Denver Metropolitan Area, but

this would mostly be outside of Jefferson County. Jefferson County’s first responders would likely be heavily involved in mutual aid assistance should an event occur.

The portions of the planning area exposed to significant impacts by a dam failure are numerous. Within the planning area (the County limits) there are 30 high hazard and 11 significant hazard dams. The jurisdictions and the number of dams upstream of them are listed in Table 4-15 and Figure 4-8; dam locations are shown in the maps in the hazard profile earlier in this section. The table notes the first jurisdiction to be impacted by dams. Note that the dams that threaten communities such as Golden in the Clear Creek watershed may also impact Wheat Ridge or other parts of the unincorporated areas.

There are numerous dams outside the county limits whose failure could have impacts inside the county. An analysis of all the watersheds that drain into Jefferson County revealed that there is one high hazard dam and one significant hazard dam whose failure could have impacts in unincorporated Jefferson County.

Table 4-15 Summary of High and Significant Hazard Dams Inside Jefferson County

First Downstream Area At-Risk	# of High Hazard Dams Upstream	# of Significant Hazard Dams Upstream
Arvada	8	1
Bow Mar	0	1
Golden	1	0
Lakewood	7	5
Littleton	2	2
Morrison	2	0
Pleasant View	1	0
Unincorporated Jefferson County	4	2
Westminster	4	0
Wheat Ridge	1	0
Total	30	11

Source: Jefferson County, National Inventory of Dams, NHD

General Property

Losses from a dam failure vary based on the dam, cause of failure, warning time for impacted communities, and time of day. Potential property loss estimates are in the billions, along with multiple anticipated deaths and injuries. Inundation maps that identify anticipated flooded areas (which may not coincide with known floodplains) are produced for all high hazard dams and are contained in the Emergency Action Plan (EAP) required for each dam. However, the information contained in those plans is considered sensitive and is not widely distributed. Therefore, structures and potential loss estimates in the county are based on approximate estimates for some of the dams present countywide and are provided in Table 4-16 and Table 4-17.

The total properties at risk and their improvements were found by counting the number of parcels intersecting with the dam inundation extents available and summing those improvement values.

Table 4-16 Dam Inundation Risk to Properties and Population by Jurisdiction

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Arvada	6,921	7,427	\$2,576,108,097	\$1,563,274,479	\$4,139,382,576	16,194

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Golden	522	572	\$338,765,969	\$237,380,701	\$576,146,670	883
Lakewood	5,120	5,473	\$1,595,152,222	\$834,074,380	\$2,429,226,602	11,461
Morrison	6	6	\$1,851,531	\$1,031,533	\$2,883,064	10
Wheat Ridge	2,373	3,072	\$786,308,504	\$523,827,235	\$1,310,135,739	4,418
Unincorporated	3,083	3,283	\$1,246,893,571	\$779,693,472	\$2,026,587,043	7,387
Total	18,025	19,833	\$6,545,079,894	\$3,939,281,799	\$10,484,361,693	40,354

Source: Jefferson County Assessor, National Inventory of Dams, NHD

Based on the above results, Arvada has over 6,000 parcels potentially exposed to dam inundation hazards, followed by Lakewood (5,120 parcels exposed), Wheat Ridge (2,373 parcels exposed) and the unincorporated areas of the county (3,083 parcels). Further analysis shows Wheat Ridge has the greatest total percentage (21%) of parcels at risk to inundation, followed by Arvada (16%) and Lakewood (10%), refer to Table 4-17.

Table 4-17 summarizes parcels at risk by property type and jurisdiction. The table below indicates that Residential properties are at highest risk based on their total counts and total values, followed by Commercial, Exempt, Industrial and Mixed Use parcels. The estimated total value exposed to the available dam inundation layers amount to over \$10 billion based on the available data, which again may be limited in detail and extent.

Table 4-17 Dam Inundation Effects on Parcels – Estimates by Parcel Type

Jurisdiction	Property Type	Improved Parcels	Building Parcels	Improved Value	Content Value	Total Value	% of Parcels at Risk
Arvada	Agriculture	3	3	\$265,224	\$265,224	\$530,448	
	Commercial	174	238	\$191,228,879	\$191,228,879	\$382,457,758	
	Exempt	23	26	\$35,076,293	\$35,076,293	\$70,152,586	
	Industrial	135	174	\$140,155,569	\$210,233,354	\$350,388,923	
	Mixed Use	56	75	\$43,559,327	\$43,559,327	\$87,118,654	
	Residential	6,530	6,911	\$2,165,822,805	\$1,082,911,403	\$3,248,734,208	
	Total	6,921	7,427	\$2,576,108,097	\$1,563,274,479	\$4,139,382,576	16%
Golden	Commercial	65	92	\$68,831,101	\$68,831,101	\$137,662,202	
	Exempt	12	13	\$42,696,376	\$42,696,376	\$85,392,752	
	Industrial	3	3	\$3,441,445	\$5,162,168	\$8,603,613	
	Mixed Use	48	54	\$17,585,066	\$17,585,066	\$35,170,132	
	Residential	394	410	\$206,211,981	\$103,105,991	\$309,317,972	
	Total	522	572	\$338,765,969	\$237,380,701	\$576,146,670	9%
Lakewood	Agriculture	1	1	\$46,378	\$46,378	\$92,756	
	Commercial	56	149	\$32,534,002	\$32,534,002	\$65,068,004	
	Exempt	8	13	\$32,249,867	\$32,249,867	\$64,499,734	
	Industrial	1	3	\$1,087,099	\$1,630,649	\$2,717,748	
	Mixed Use	5	6	\$5,992,092	\$5,992,092	\$11,984,184	
	Residential	5,049	5,301	\$1,523,242,784	\$761,621,392	\$2,284,864,176	
	Total	5,120	5,473	\$1,595,152,222	\$834,074,380	\$2,429,226,602	10%
Morrison	Commercial	1	1	\$211,534	\$211,534	\$423,068	
	Residential	5	5	\$1,639,997	\$819,999	\$2,459,996	

Jurisdiction	Property Type	Improved Parcels	Building Parcels	Improved Value	Content Value	Total Value	% of Parcels at Risk
	Total	6	6	\$1,851,531	\$1,031,533	\$2,883,064	4%
Wheat Ridge	Agriculture	1	1	\$11,380	\$11,380	\$22,760	
	Commercial	107	159	\$90,654,979	\$90,654,979	\$181,309,958	
	Exempt	18	22	\$8,220,916	\$8,220,916	\$16,441,832	
	Industrial	150	197	\$78,103,977	\$117,155,966	\$195,259,943	
	Mixed Use	13	14	\$6,250,736	\$6,250,736	\$12,501,472	
	Residential	2,084	2,679	\$603,066,516	\$301,533,258	\$904,599,774	
	Total	2,373	3,072	\$786,308,504	\$523,827,235	\$1,310,135,739	21%
Unincorporated	Agriculture	2	2	\$249,352	\$249,352	\$498,704	
	Commercial	54	79	\$162,511,303	\$162,511,303	\$325,022,606	
	Exempt	14	17	\$19,518,307	\$19,518,307	\$39,036,614	
	Industrial	88	171	\$61,105,441	\$91,658,162	\$152,763,603	
	Mixed Use	28	30	\$8,003,529	\$8,003,529	\$16,007,058	
	Residential	2,897	2,984	\$995,505,639	\$497,752,820	\$1,493,258,459	
	Total	3,083	3,283	\$1,246,893,571	\$779,693,472	\$2,026,587,043	4%
Grand Total	18,025	19,833	\$6,545,079,894	\$3,939,281,799	\$10,484,361,693	9%	

Source: Jefferson County Assessor, National Inventory of Dams, NHD

Each dam owner is responsible for having an EAP and inundation map for their facility. These documents are regularly updated and shared with Jefferson County Emergency Management and other governmental entities that have a direct role in emergency response. Emergency Management and response entities use the EAPs and inundation maps when developing response plans. Questions should be directed to the Emergency Management Department or the facility owner.

People

Persons located downstream of a dam are at risk of a dam failure, though the level of risk can be tempered by topography, amount of water or material in the reservoir/dam/structure, and time of day of the breach. Injuries and fatalities can occur from debris, drowning, or release of sludge or other hazardous material. People in the inundation area may need to be evacuated, cared for, and possibly permanently relocated. Impacts could include hundreds of evacuations and possibly casualties, depending on the dam involved. Specific population impacts are noted in Table 4-16; total people at risk were calculated by multiplying the average number of persons per household in Jefferson County based on Census estimates times the number of properties where the dam inundation extents were available. An estimated total of 40,354 people could be at risk countywide based on the rough estimation used, though again it is unlikely that all the parcels or properties found to overlap with dam inundation extents will be populated by the total persons estimated or actually affected by a dam failure event simultaneously. This estimate does not account for non-resident or visitor population.

Low head dams pose a risk to even the most experienced recreational users of rivers due to the difficulty to detect the dams when approaching from upstream and risk of becoming trapped in the low head dams recirculating currents. According to the Colorado Department of Natural Resources, Dam Safety Division, in recent years Colorado has experienced 1 fatality annually and there have been a total of 13 fatal incidents recorded since 1986 (Zimmer 2019). The Dam Safety Division, Low Head Dam Inventory Final Report (October 2019), notes an increase of low head dam incidents in the state directly correlated to increased recreational water usage by out-of-state tourists, new residents, and long-term residents (Zimmer 2019). As the population increases in Colorado and in Jefferson County there is the potential for increased fatalities from low head dams.

Critical Facilities and Infrastructure

A total dam failure can cause catastrophic impacts to areas downstream of the water body, including critical infrastructure. Any critical asset located under the dam in an inundation area would be susceptible to the impacts of a dam failure. Of particular risk would be roads and bridges that could be vulnerable to washouts, further complicating response and recovery by cutting off impacted areas. Based on the critical facility inventory considered in the updating of this plan and intersected with the dam inundation extents available, 316 critical facilities were found to be at risk. These at-risk facilities are listed in the tables below by jurisdiction and critical facility classification as based on the FEMA Lifeline categories (FEMA Community Lifelines, 2019).

Table 4-18 Dam Inundation Effects on Critical Facilities – Estimates by FEMA Lifeline

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	62
	Microwave Service Towers	21
	Paging Transmission	1
	Total	84
Energy	Electric Substation	3
	Power Plant	3
	Total	6
Food, Water, Shelter	Wastewater Plant	2
	Water Facility	2
	Total	4
Hazardous Material	RMP Facility	1
	Tier II	30
	Total	31
Health and Medical	Nursing Home	15
	Total	15
Safety and Security	EOC	2
	Fire Station	5
	Government Facility	4
	Law Enforcement	3
	School	16
	Total	30
Transportation	Bridge	146
	Total	146
Grand Total		316

Source: National Inventory of Dams, HIFLD, CERC

Economy

Extensive and long-lasting economic impacts could result from a major dam failure or inundation event, including the long-term loss of water in a reservoir, which may be critical for potable water needs, agriculture, or local wildlife. A major dam failure and loss of water from a key structure could bring about direct business and industry damages and potential indirect disruption of the local economy, and potentially affect important transportation routes enabling business and tourism into the county.

Historical, Cultural, and Natural Resources

Dam or reservoir failure effects on the environment would be similar to those caused by flooding from other causes. Water could erode stream channels and topsoil and cover the environment with debris. For the most part the environment is resilient and would be able to rebound from whatever damages occurred, though this process could take years. However, historic and cultural resources could be affected just as housing or critical infrastructures would, were a dam to fail and cause downstream inundation that could further erode surfaces or cause scouring of structural foundations.

Future Development

An analysis of the Year Built field in County Assessor's Office data shows that from 2015 through 2020, 784 new structures have been built in dam inundation areas. While not a large number compared to the total structures at risk described above, it does show that new development is continuing in areas potentially at risk of dam related flooding.

It is important that the County and municipalities keep the dam failure hazard in mind when permitting new development, particularly downstream of the high and significant hazard dams present in the County. New residential development is occurring in western Arvada in the vicinity of Indiana and County Road 19, west of Standley Lake and below Welton reservoir. This development increases the number of properties, population, and infrastructure vulnerable to a dam failure, and may even change the ratings of upstream dams.

There are currently 72 low hazard dams within the County boundaries. These could become significant or high hazard dams if development occurs below them and the consequences of failure increase. Regular inspection and monitoring of dams, exercising and updating of EAPs, and rapid response to problems when detected at dams are ways to mitigate the potential impacts of these rare but potentially catastrophic events.

Overall Hazard Significance

Dam failures in Jefferson County have a large potential impact on the planning area. The geographic extent of the hazard is considered **significant**. The probability of future occurrences is considered **occasional** and the magnitude/severity for the event of record is **critical** or even **catastrophic**. The HMPC considers the hazard to have a **medium** overall impact rating on the County. This corresponds to the available data drawn from known occurrences; however, the potential record of event equates to an overall impact rating of **high**.

An event that would cause all dams in the planning area to fail is extremely unlikely. However, events which may impact the structural integrity of dams, such as earthquakes, may also be region-wide and therefore it is important to assess the planning-area wide impact of all dams, not just incident-specific occurrences. Furthermore, the failure of any high-hazard dam in the planning area is considered an event of critical magnitude and severity, and therefore, despite having a more limited geographic extent, is still a significant planning consideration.

4.3.4 Drought

Description

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.

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

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

With its semiarid conditions, drought is a natural part of the Colorado climate cycle. Due to natural variations in climate and precipitation sources, it is rare for all of Colorado to be deficient in moisture at the same time. However, single season droughts over some portion of the state are quite common. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users that have a different water supply. Individual water suppliers may use criteria, such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler, to define their water supply conditions. Drought is further compounded by the complexity of water rights throughout the Western U.S.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Colorado are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flash flooding and erosion. A drought may also increase the speed at which dead and fallen trees dry out and become particularly dangerous as fuel sources in wildfires. Drought may also weaken trees in areas already affected by mountain pine beetle infestations, causing more extensive damage to trees and increasing wildfire risks. An ongoing drought which severely inhibits natural plant growth cycles may increase the susceptibility of the area to wildfire for a period of time. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

Geographic Extent

Droughts are regional events, sometimes impacting multiple states simultaneously. Therefore, as the climate of the planning region is fairly continuous, it is reasonable to assume that a drought will impact the entire planning region simultaneously. Based on this information, the geographic extent rating for drought is **extensive**.

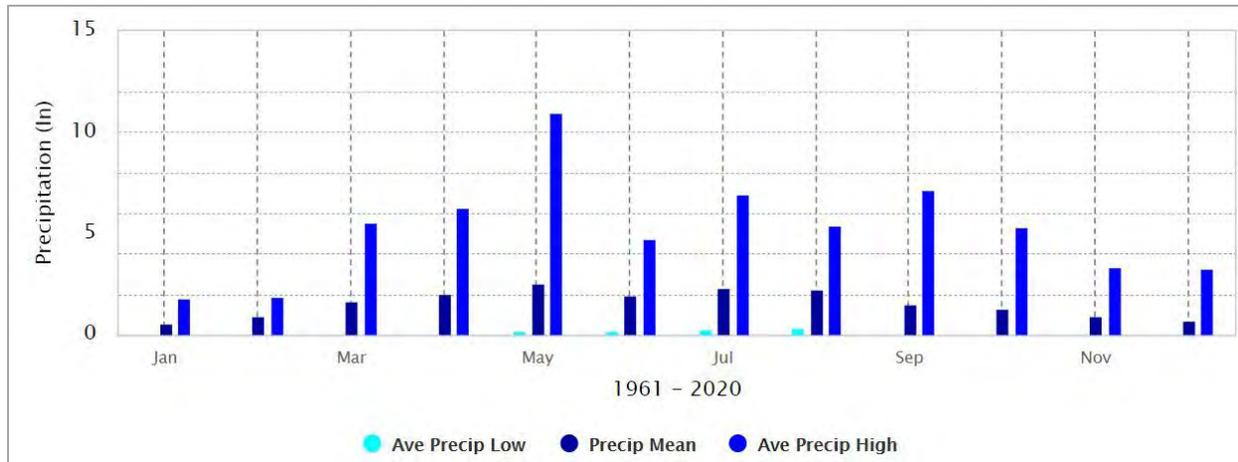
The Southwest Climate and Environmental Information Collaborative (SCENIC) reports precipitation data from weather stations in and around Jefferson County. The data reported here are from two of the stations: Lakewood and Evergreen. Table 4-19 contains precipitation summaries for the two stations, and Figure 4-9 through Figure 4-10 show monthly average total precipitation. These summaries include rainfall only. Drought in Colorado and Jefferson County is largely contingent upon winter snowpack, which is discussed in Section 4.2.13 Severe Winter Storms.

Table 4-19 Jefferson County Precipitation Summaries

Station	Average Annual Precipitation	Month with Most Precipitation/Average Precipitation	Highest Monthly Precipitation	Highest Annual Precipitation	Lowest Annual Precipitation
Evergreen (052790) ²	18.88	May/2.55	10.94/May 1969	17.87/1992	12.55/1968
Lakewood (054762) ³	16.67	May/2.55	6.87/Sept. 1976	19.66/1984	9.71/1968

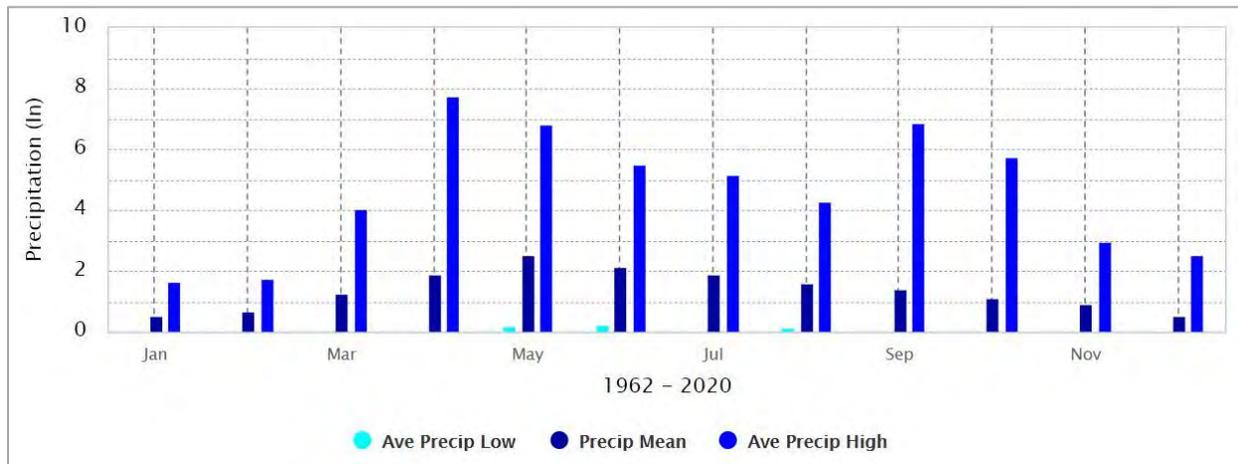
Source: SCENIC ¹All totals are reported inches; ²Period of Record: 1961-2020 ³Period of Record: 1962-2020

Figure 4-9 Evergreen Station (052790) Average Monthly Precipitation (In)



Source: SCENIC

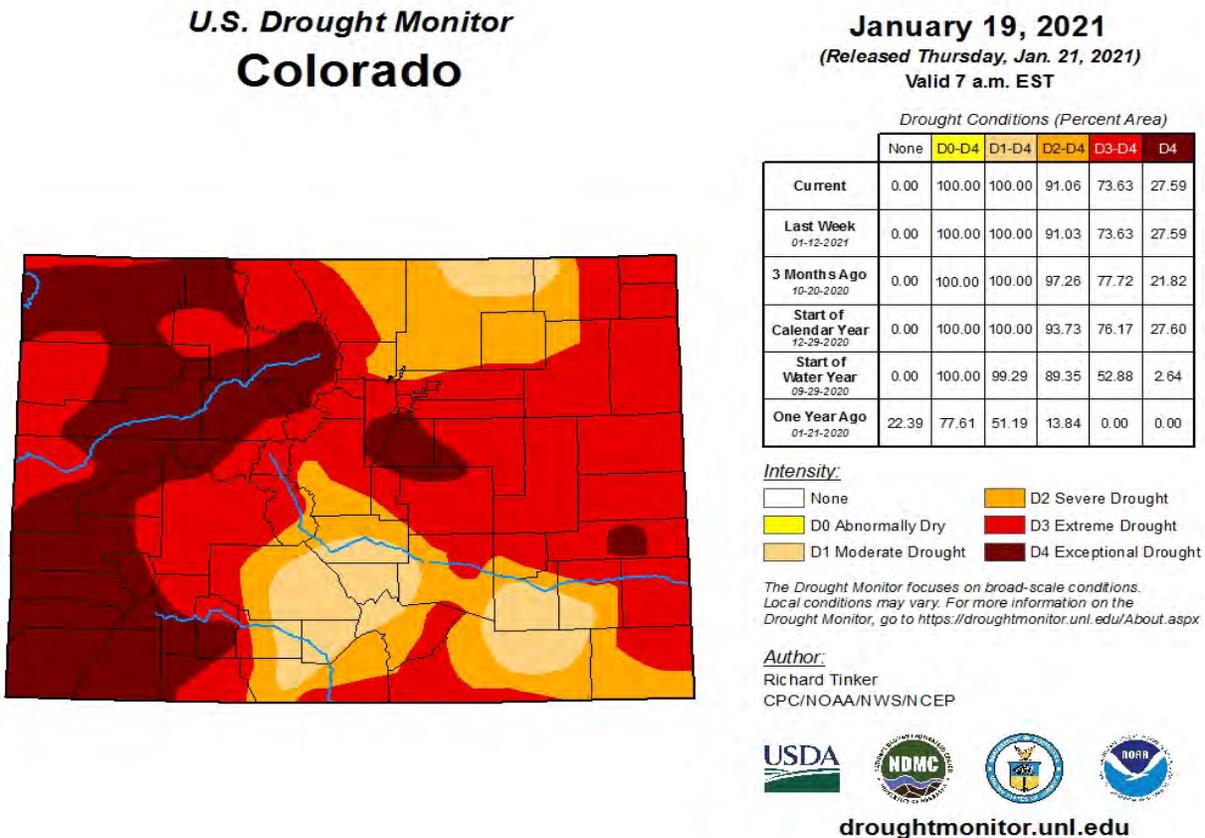
Figure 4-10 Lakewood Station (05472) Average Monthly Precipitation (In)



Source: SCENIC

Figure 4-11 shows the U.S. Drought Monitor for Colorado as of January 21, 2021, illustrating the regional nature of drought.

Figure 4-11 U.S. Drought Monitor, As of January 21, 2021



Previous Occurrences

Colorado has experienced multiple severe droughts over the years. The most significant of the instrumented period (which began in the late 1800s) are listed in Table 4-20. Although drought conditions can vary across the state, it is likely that Jefferson County was affected by most of these dry periods.

Table 4-20 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

Date	Dry	Wet	Duration (years)
2011-2013	X		2
2018	X		1

Source: Source: McKee, et al. *Modified for the Colorado State Drought Plan in 2010 and Jefferson County Mitigation Plan 2021 based on input from the Colorado Climate Center and US Drought Monitor.

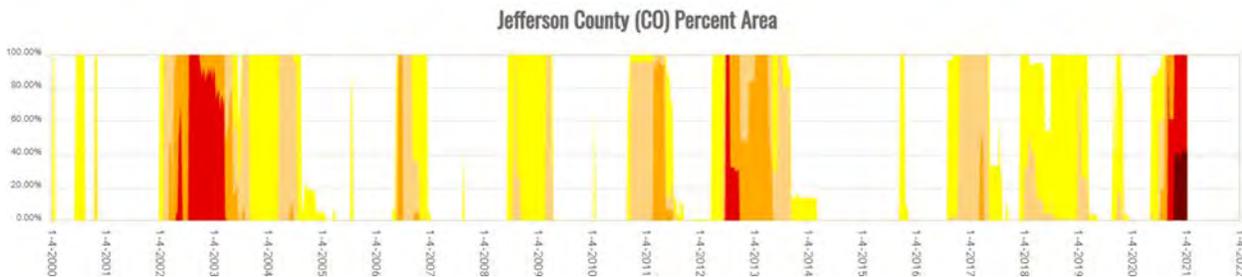
Drought is a regular and widespread occurrence in the State of Colorado. According to the U.S. Drought Monitor records for Jefferson County, in the 1,096-week period from 2000 through January 4, 2021, the county spent 645 weeks (60% of the time) in some level of drought, defined as Abnormally Dry (D0) or worse conditions. Approximately 36% of the time, or 393 weeks, was spent in Moderate Drought (D1) or worse conditions. Weeks in drought are summarized in Table 4-21 and shown in time series in Figure 4-12.

Table 4-21 Jefferson County Weeks in Drought by Intensity, 2000-Jan. 4, 2021

Category	Description	Palmer Drought Severity Index (PDSI)	Standardized Precipitation Index (SPI)	Jefferson County Weeks in Drought, 2000-Jan. 4, 2021
D0	Abnormally Dry	-1.0 to -1.9	-0.5 to -0.7	645
D1	Moderate Drought	-2.0 to -2.9	-0.8 to -1.2	393
D2	Severe Drought	-3.0 to -3.9	-1.3 to -1.5	194
D3	Extreme Drought	-4.0 to -4.9	-1.6 to -1.9	74
D4	Exceptional Drought	-5.0 or less	-2.0 or less	11

Source: U.S. Drought Monitor

Figure 4-12 Jefferson County Drought Intensity, 2000-Jan. 4, 2021



Source: U.S. Drought Monitor

Since 2012 there have been 8 drought declarations issued by the USDA’s Secretary of Agriculture in Jefferson County, 7 of which were Fast Track Secretarial disaster designations (see Table 4-2 in Section 4.1.4). According to the Secretary of Agriculture, a Fast Track designation is for a severe drought and provides an automatic designation when, during the growing season, any portion of the county meets the severe drought intensity value for eight consecutive weeks or more.

April 2002: Statewide drought event. April, normally the third snowiest month of the year, ended up being the third driest April on record for Denver. Only a trace of snow was recorded for the month with .23 inches liquid precipitation. The snowpack in the North Platte River Basin was only 44 percent of normal by the end of the month. The snowpack was much lower across some of the other Colorado river basins. The very dry conditions prompted the Governor to request a statewide emergency drought declaration from the U.S. Agricultural Secretary, making farmers and ranchers eligible for federal assistance.

June 2002: Ongoing drought conditions, hot temperature, low relative humidity and strong winds caused the Hayman Fire to grow into, at the time, the largest wildfire in state’s history. Located in the foothills

southwest of Denver the wildfire consumed a total of 137,760 acres of forest land, approximately 95,000 acres was burned in Park, Jefferson and Douglas Counties.

March 2011: The month of March 2011 was the eighth least snowiest March on record with 2.9 inches of snowfall at Denver International Airport. The seasonal snowfall of 20.6 inches, measured between July 1, 2010 and March 31, 2011 made it the third least snowiest season to date. The combination of above normal temperatures, windy conditions and sparse precipitation resulted in very dry conditions along the Front Range Foothills, Urban Corridor and Northeast Plains. Over two dozen wildfires occurred throughout the region in March alone. The Indian Gulch Wildfire occurred just west of Golden, between Clear Creek and Golden Gate Canyons from March 20-25th. Strong winds coupled with very rugged terrain hampered firefighting efforts and allowed the wildfire to consume another 1570 acres.

2012 Drought: Even though 2011 was very wet across northern Colorado, the extreme drought during this time in Texas, New Mexico, and Oklahoma was also felt in the Rio Grande and Arkansas Basins in Colorado. This trend continued in those basins as 2012 began, but also increased in breadth across the rest of Colorado. Based on the U.S. Drought Monitor, approximately 50% of Colorado was already under drought conditions at the beginning of 2012. Drought conditions and a period of extremely hot temperatures in June 2012 contributed to very dry forests, contributing to the conditions that led to the High Park fire in northern Colorado and the Waldo Canyon fire near Colorado Springs, two of Colorado's most destructive wildfires. Drought conditions also exacerbated the Lower North Fork fire in Jefferson County in March of 2012. Reservoir levels in many portions of the State helped abate some of the drought impacts seen in 2011-2013. Had the reservoir levels not been at levels sufficient for carryover storage into 2012 (due to record breaking high snowpack in 2011) in many river basins, many of the impacts discussed above may have been worse.

2018-2021 Drought: According to the HMPC, drought that began in May 2018 and continuing into 2021 has caused inability to store snowmelt runoff on Beaver Brook due to junior water rights on Clear Creek. This has impacted the entire Lookout Mountain Water District although minimal revenue has been lost. The Water District considers a similar event is highly likely to occur in the future.

NOAA's National Centers for Environmental Information (NCEI) records 3 drought events between 1950 and 2020. Brief descriptions of each event are shown below, no damages or casualties were recorded for any of the events. Note, the June 9, 2002 and March 1, 2011 events were related to wildfire events which were both fueled by ongoing drought conditions.

Probability of Future Occurrences

According to information from the Colorado Drought Mitigation and Response Plan (2018), 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. Similarly looking at the weekly U.S. Drought Monitor data cited above, Jefferson County was in moderate or worse drought conditions 36% of the time. Thus, the probability of drought conditions is **likely**.

Magnitude and Severity

The impacts drought can have on modern society are often underrated. Droughts cause obvious and severe impacts on agricultural areas by destroying existing crops and prolonging unsuitable growing conditions which hinders efforts to recover agricultural losses. This causes secondary financial impacts first on the farmers, who have no crops to sell, and then on the consumers, who must pay higher prices for scarce produce. Increased demand for a decreased water supply raises water costs, which also drives up the overall costs to both farm producers and consumers.

Urban areas are also impacted by rising water costs, which may impact personal property and personal water usage bills. Recreational uses which are water-dependent may increase significantly in price or decrease in availability, particularly those which are based in reservoirs or lakes, as the water levels may be too low to sustain safe recreation. Finally, the increased risk of wildfires impacts the planning region. While the hazard of fire itself is profiled separately, drought conditions increase the likelihood that wildfires will occur, either naturally or due to human causes.

To calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it reflects common occurrence. The event of record for Jefferson County occurred between 1999 and 2003. The event impacted the entire planning area, although the exact percent of directly-impacted property in the County is not available. Any damages inflicted on critical facilities and services (critical infrastructure) resulted in no loss or disruption of services. There were no directly attributable documented illnesses or injuries and the medical response capability of the County was not impacted. However, the drought seriously impacted water supply levels and water quality, and several severe wildfires, augmented by drought conditions, occurred in the planning area during this time. The impact on the costs of water resulted in significantly higher water billing rates, and some jurisdictions implemented water regulation measures which also extended beyond the drought period.

The U.S. Drought Monitor classifies droughts into different categories, from D0 (Abnormally Dry) to D4 (Exceptional Drought), as shown in Figure 4-13. Periods of dryness are classified in one of these categories as the drought's life cycle is tracked. The following table explains each of these categories.

Figure 4-13 U.S. Drought Monitor Drought Severity Classifications

Category	Description	Possible Impacts	Ranges				Objective Drought Indicator Blends (Percentiles)
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	
D0	Abnormally Dry	<ul style="list-style-type: none"> Going into drought: <ul style="list-style-type: none"> short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none"> some lingering water deficits pastures or crops not fully recovered 	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested 	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> Crop or pasture losses likely Water shortages common Water restrictions imposed 	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> Major crop/pasture losses Widespread water shortages or restrictions 	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies 	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: U.S. Drought Monitor

Drought impacts in Jefferson 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. Although the agricultural industry in the County is limited, it is expected to experience crop losses and livestock feeding expenses and deaths. Jefferson County will see an increase in dry fuels, beetle kill, associated wildfires, and some loss of tourism/recreation revenue. Water supply issues for municipal, industrial, and domestic needs will be a concern for the entire County. Lawn and tree impacts in suburban areas could result from water restrictions. Vulnerability increases with consecutive winters of below-average snowpack. 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 and even landslide hazard.

Based on these factors, the magnitude severity ratings for droughts are considered **critical**.

Climate Change Considerations

Climate change can have impacts both in terms of inter-annual droughts and intra-annual runoff patterns (State of Colorado Drought Mitigation and Response Plan Update, 2018). Temperatures increased and resulting changes in evaporation and soil moistures will also add to the trend of decreasing runoff in a majority of Colorado Basins. The following table shows the challenges water managers may face with the projected changes in climate.

Table 4-22 Future Drought Vulnerability Due to Climate Change and Challenges Faced by Colorado Water Managers

Challenge	Observed and/or Projected Change
Water demands for agriculture and outdoor watering	Increasing temperatures raise evapotranspiration by plants, lower soil moisture, alter growing seasons, and thus increase water demand.
Water supply infrastructure	Changes in snowpack, streamflow timing, and hydrograph evolution may affect reservoir operations including flood control and storage. Changes in the timing and magnitude of runoff may affect functioning of diversion, storage, and conveyance structures.
Legal water systems	Earlier runoff may complicate prior appropriation systems and interstate water compacts, affecting which rights holders receive water and operations plans for reservoirs
Water quality	Although other factors have a large impact, “water quality is sensitive both to increased water temperatures and changes in patterns of precipitation” (CCSP SAP 4.3, p. 149). For example, changes in the timing and hydrograph may affect sediment load and pollution, impacting human health.
Energy demand and operating costs	Warmer air temperatures may place higher demands on hydropower reservoirs for peaking power. Warmer lake and stream temperatures may affect water use by cooling power plants and other industries.
Mountain habitats	Increasing temperature and soil moisture changes may shift mountain habitats toward higher elevation.
Interplay among forests, hydrology, wildfires, and pests	Changes in air, water, and soil temperatures may affect the relationships between forests, surface and groundwater, wildfire, and insect pests. Water-stressed trees, for example, may be more vulnerable to pests.
Riparian habitats and fisheries	Stream temperatures are expected to increase as the climate warms, which could have direct and indirect effects on aquatic ecosystems (CCSP SAP 43.), including the spread of instream non-native species and diseases to higher elevation and the potential for nonnative plant species to invade riparian areas. Changes in streamflow intensity and timing may also affect riparian ecosystems.
Water – and snow – based recreation	Changes in reservoir storage affect lake and river recreation activities; changes in streamflow intensity and timing will continue to affect rafting directly and trout fishing indirectly. Changes in the character and timing of snowpack and the ratio of snowfall to rainfall will continue to influence winter recreational activities and tourism.
Groundwater resources	Changes in long-term precipitation and soil moisture can affect groundwater recharge rates; coupled with demand issues, this may mean greater pressure on groundwater resources.

Source: State of Colorado Drought Mitigation and Response Plan 2018, Reproduced from CWCB

Vulnerability Assessment

Based on Jefferson County’s recent multi-year droughts and Colorado’s drought history, it is evident that all of Jefferson County is vulnerable to drought. However, the impacts of future droughts will vary by region. The agricultural industry of the County, though limited, could experience hardships, including agricultural losses, and livestock feeding expenses and deaths. The County will see an increase in dry fuels, beetle kill, and associated wildfires and some loss of tourism/recreation revenue. Examples of

potential impacts to recreation include low water flows in the Golden Whitewater Park, fire bans and closures of campgrounds in the Pike National Forest, and water restrictions on golf courses.

The Colorado State Drought Mitigation Plan includes vulnerability to state owned buildings and critical infrastructure, state land board lands, state operated recreational activity, aquatic habitat and species, agriculture activities, protected environments, recreation, socioeconomics, and the municipal and industrial (M&I) sectors. Jefferson County generally ranked moderate in vulnerability across the sectors. The sector vulnerability scores for Jefferson County are shown in Table 4-23. A score of 3.0 or above means that sector is highly vulnerable to drought; Jefferson County doesn't reach the 3.0 score for any of the sectors.

Table 4-23 Jefferson County Drought Vulnerability Score by Sector

Sector	Score
Recreation	2.48
Energy	1.00
Agriculture	2.42
State Assets	2.59
Socioeconomic	2.0
Environment	2.27
Average Overall Vulnerability	2.13

Source: 2018 State of Colorado Drought Mitigation and Response Plan

The National Drought Mitigation Center (NDMC), located at the University of Nebraska in Lincoln, provides a clearinghouse for information on the effects of drought based on reports from media, observers, impact records, and other sources.

According to the NDMC's Drought Impact Reporter, during the 20-year period from 2000 through 2020, 924 drought impacts were recorded for the State of Colorado, of which 53 were reported to affect Jefferson County. Table 4-24 summarizes the number of impacts reported by category and the years impacts were reported for each category, where available. Note that the Drought Impact Reporter assigns multiple categories to each impact, so there is some duplication between categories.

Table 4-24 NDMC Drought Impact Reporter, 2000-2020

Impact Category	# of Impacts
Agriculture	8
Business & Industry	2
Fire	13
Plants & Wildlife	14
Relief, Response & Restrictions	20
Society & Public Health	6
Tourism & Recreation	4
Water Supply & Quality	16

Source: National Drought Mitigation Center Drought Impact Reporter (<https://droughtreporter.unl.edu/map/>)

General Property

Drought does not typically have a direct impact on buildings, although an increase in expanding or collapsing soils could affect building foundations. Developed areas may experience damages to landscaping if water use restrictions are put in place, however these losses are not considered significant.

People

The historical and potential impacts of drought on populations include agricultural and recreation/tourism sector job loss, secondary economic losses to local businesses and public recreational resources, increased cost to local and state government for large-scale water acquisition and delivery, and water rationing and water wells running dry for individuals and families. Other public health issues can include impaired drinking water quality, increased incidence of mosquito-borne illness, an increase in wildlife-human confrontations and respiratory complications as a result of declined air quality in times of drought.

Critical Facilities and Infrastructure

Water supply issues for municipal, industrial, and domestic needs will be a concern for the entire County during droughts. Water restrictions could lead to lawn and tree impacts in suburban areas. Much of Jefferson County's water comes from snow melt runoff in the high country of the western County that is captured in reservoir storage. Vulnerability increases with consecutive winters of below-average snowpack.

According to the State Drought Plan drought vulnerability within the Denver Metropolitan Area is relatively low when compared to other regions within the State. This is primarily attributed to the fact that Denver Water owns one of the most senior urban water rights portfolios along the Front Range. Denver Water has also taken additional drought mitigation actions since 2002 to further improve water supply reliability. Additional vulnerability and capability information on drought can be referenced in the Denver Water Annex.

Economy

Jefferson County's reliance on tourism and the recreation sector as the main economic base make it particularly vulnerable to the effects of drought. Wildlife viewing, hunting and fishing activities have been impacted in past drought events by lower production and requirement numbers and by animals moving away from traditional viewing and hunting areas due to lack of water, loss of vegetative cover, decreased streamflows, sedimentation and fish decline. Drought also has an impact on camping due to forced closures of campsites and surrounding forest due to wildfires and risk of wildfire and hazardous trees are all exacerbated by drought. Drought impacts on the County's natural environment and the cascading impacts to the recreation sector could lead to less people visiting and spending money in County which could have a negative impact on the entire local economy.

The Colorado Water Conservation Board (CWCB) maintains a Future Avoided Cost Explorer (FACE) tool, which estimates annual damages from drought. According to FACE analysis, Jefferson County could potentially experience an average annual loss of \$210,000 due to drought conditions under current population and climate scenarios.

Historic, Cultural, and Natural Resources

Severe, prolonged drought can have a negative impact on the natural environment. Wildlife and natural habitats can be affected, including the shrinkage of habitat, dwindling food supplies and the migration of wildlife to more palatable areas. Prolonged drought can cause poor soil quality and increased soil erosion. One of the prevailing impacts of drought to the natural environment is the increased risk of pest infestations and wildfires that burn larger and more intensely during dry conditions. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Future Development

Drought vulnerability will increase with future development as there will be increased demands for limited water resources. Future growth in the unincorporated areas will mean more wells and more demands on groundwater and surface water resources. Increased development also lends itself to the increased potential for impervious surface development, which reduces the amount of water absorbed into the ground from precipitation. State law (CRS 30-28-133(3)) requires that local governments "shall not approve an application for a development permit unless...the applicant has satisfactorily demonstrated that the proposed water supply will be adequate." The County implements this by requiring the Planning and Zoning Department to complete a Water Availability Analysis and Aquifer Test for all new

development. Section 21 Water Supply of the County’s Land Development Regulations as well as policies in the Comprehensive Master Plan require new development to consider future water usage and water conservation. Refer to Section 2 Capabilities Assessment for further details on these water conservation and usage policies.

Lookout Mountain Water District noted that continuing residential development on Lookout Mountain has increased the need for more fire hydrants and better lateral pipelines to supply them water. Warming trends have increased the likelihood of early snowmelt runoff occurring before free river on Clear Creek, increasing the need for the District to acquire senior water rights on Clear Creek to enable Upper Beaver Brook reservoir to fill every year.

The Future Avoided Cost Explorer (FACE) developed by the Colorado Water Conservation Board (CWCB) provides an in-depth look at the potential economic impacts and expected annual damages from future flood, drought and wildfire events. The tool looks at three different climate scenarios (current climate conditions, 2050 future – moderately warmer climate and 2050 – severely warmer climate) as well as compares current population to low, medium and high growth population scenarios. The following table compares the estimated annual damages for Jefferson County due to drought events for each of the climate and population scenarios.

Table 4-25 Potential Future Economic Losses from Drought in Jefferson County

Climate Scenarios	Population Scenarios		
	Low Growth (~653,000)	Medium Growth (~695,000)	High Growth (~740,000)
Current Conditions	Total damages: \$950,000	Total damages: \$950,000	Total damages: \$1M
	Total damages per person: less than \$10	Total damages per person: less than \$10	Total damages per person: less than \$10
Moderately Warmer Climate by 2050	Total damages: \$1.4M	Total damages: \$1.5M	Total damages: \$1.5M
	Total damages per person: less than \$10	Total damages per person: less than \$10	Total damages per person: less than \$10
Severely Warmer Climate by 2050	Total damages: \$1.7M	Total damages: \$1.7M	Total damages: \$1.8M
	Total damages per person: less than \$10	Total damages per person: less than \$10	Total damages per person: less than \$10

Source: Colorado Water Conservation Board (CWCB) Future Avoided Cost Explorer: Hazards <https://cwcb.colorado.gov/FACE>

Overall Hazard Significance

Droughts in Jefferson County do have an impact on the planning area. While the impacts of the drought may be less severe than those inflicted on primarily agricultural counties, it is nevertheless a significant hazard to examine. As discussed earlier, the most profound impacts of drought on urbanized planning areas such as this are in the increased costs of water for general and recreational use and the heightened wildfire conditions. In fact, all of the drought periods recorded here culminated in a wildfire event, which is of particular concern for Jefferson County. The geographic extent of the hazard is considered **extensive**. The probability of future occurrences is considered **likely** and the magnitude/severity for the event of record is **critical**. This equates to an overall impact rating of **high**.

4.3.5 Earthquake

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. 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 at any given location on the ground surface as felt by humans or resulting damage to structures and defined in the Modified Mercalli scale (see Table 4-26). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4-26 Modified Mercalli Intensity (MMI) Scale

Magnitude	Mercalli Intensity	Effects	Frequency
Less than 2.0	I	Micro-earthquakes, not felt or rarely felt; recorded by seismographs.	Continual
2.0-2.9	I to II	Felt slightly by some people; damages to buildings.	Over 1M per year
3.0-3.9	II to IV	Often felt by people; rarely causes damage; shaking of indoor objects noticeable.	Over 100,000 per year
4.0-4.9	IV to VI	Noticeable shaking of indoor objects and rattling noises; felt by most people in the affected area; slightly felt outside; generally, no to minimal damage.	10K to 15K per year
5.0-5.9	VI to VIII	Can cause damage of varying severity to poorly constructed buildings; at most, none to slight damage to all other buildings. Felt by everyone.	1K to 1,500 per year
6.0-6.9	VII to X	Damage to a moderate number of well-built structures in populated areas; earthquake-resistant structures survive with slight to moderate damage; poorly designed structures receive moderate to severe damage; felt in wider areas; up to hundreds of miles/kilometers from the epicenter; strong to violent shaking in epicentral area.	100 to 150 per year
7.0-7.9	VIII<	Causes damage to most buildings, some to partially or completely collapse or receive severe damage; well-designed structures are likely to receive damage; felt across great distances with major damage mostly limited to 250 km from epicenter.	10 to 20 per year
8.0-8.9	VIII<	Major damage to buildings, structures likely to be destroyed; will cause moderate to heavy damage to sturdy or earthquake-resistant buildings; damaging in large areas; felt in extremely large regions.	One per year
9.0 and Greater	VIII<	At or near total destruction - severe damage or collapse to all buildings; heavy damage and shaking extends to distant locations; permanent changes in ground topography.	One per 10-50 years

Source: USGS. <http://earthquake.usgs.gov/learn/topics/mercalli.php>

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Other damaging effects of earthquakes include surface rupture, fissuring, ground settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, fires, and dam failure. The combination of widespread primary and secondary affects from large earthquakes make this hazard potentially devastating.

Colorado’s earthquake hazard is similar to other states in the intermountain west region. It is less than in states like California, Nevada, Washington, or Oregon, but greater than many states in the central and

eastern United States. There are many unknowns about the earthquake hazard in Colorado, but the potential for damaging earthquakes does exist.

Previous Occurrences

According to the U.S. Geological Survey (USGS), eastern Colorado is nearly aseismic, with just a few epicenters in the Arkansas and Platte river valleys. Most shocks in the history of Colorado have been centered west of the Rocky Mountain Front Range. The first seismographs in Colorado of sufficient quality to monitor earthquake activity were installed in 1962. Newspaper accounts are the primary source of published data for earthquake events before that time. Figure 4-14 illustrates historic earthquakes and Quaternary faults in Colorado.

More than 400 earthquake tremors of magnitude 2.5 or higher have been recorded in Colorado since 1867. More earthquakes of magnitude 2.5 to 3 probably occurred during that time, but were not recorded because of the sparse distribution of population and limited instrumental coverage in much of the state. For comparison, more than 20,500 similar-sized events have been recorded in California during the same period. Although many of Colorado's earthquakes occurred in mountainous regions of the state, some have been located east of the mountains. The best-known Colorado earthquakes were a series of events in the 1960s that were later shown to have been triggered by the injection of liquid waste into a deep borehole at the Rocky Mountain Arsenal northeast of Denver. These and other notable earthquakes affecting Jefferson County include:

November 7, 1882 - The first ever to cause damage at Denver, probably centered in the northern Front Range near Rocky Mountain National Park and is the largest historical earthquake in the state. The magnitude is estimated to be about 6.6 on the Richter scale. The quake was felt as far away as Salina, Kansas and Salt Lake City, Utah.

September 29, 1965 – A magnitude 4.7 earthquake epicentered near Arvada shook the northern metro area and cracked plaster and windows.

February 16, 1965 – A magnitude 4.6 located in northeastern Jefferson County – no further information.

November 14, 1966 – A strong shock rumbled through the Denver area, causing some damage at Commerce City and Eastlake. The magnitude of this event was between 4.1 and 4.4.

April 10, 1967 – This was one of the largest in a series of earthquakes that began in 1962; 118 windowpanes were broken in buildings at the Rocky Mountain Arsenal, a crack in an asphalt parking lot was noted in the Derby area, and schools were dismissed in Boulder, where walls sustained cracks. Legislators quickly moved from beneath chandeliers in the Denver Capitol Building, fearing they might fall. The Colorado School of Mines rated this shock a magnitude 5.0.

August 9, 1967 - The strongest and most widely felt shock in Denver's history struck at 6:25 in the morning. The magnitude 5.3 tremor caused the most serious damage at Northglenn, where a church's concrete pillar roof supports were weakened, and 20 windows were broken. An acoustical ceiling and light fixtures fell at one school. Many homeowners reported wall, ceiling, floor, patio, sidewalk, and foundation cracks. Several reported basement floors separated from walls. Extremely loud, explosive-like earth noises were heard. Damage on a lesser scale occurred throughout the area.

November 1967 - The Denver region was shaken by five moderate earthquakes. Two early morning shocks occurred November 14th. They awakened many residents but were not widely felt. A similar shock, magnitude 4.1, centered in the Denver area November 15th. Residents were generally shaken, but no damage was sustained. A local shock awakened a few persons in Commerce City November 25th. Houses creaked and objects rattled during this magnitude 2.1 earthquake.

November 26, 1967 - The magnitude 5.2 event caused widespread minor damage in the suburban areas of northeast Denver. Many residents reported it was the strongest earthquake they had ever experienced. It was felt at Laramie, Wyoming, to the northwest, east to Goodland, Kansas, and south to Pueblo, Colorado. At Commerce City merchandise fell in several supermarkets and walls cracked in larger buildings. Several persons scurried into the streets when buildings started shaking back and forth.

May 23, 1970 – A magnitude 4.1 earthquake struck northeastern Jefferson County on County line – no further information.

January 5, 1979 at 6:59 p.m. MST - A small but rare earthquake occurred in the central part of the State. The magnitude 2.9 tremor was centered about 30 miles northwest of Colorado Springs near Florissant and Lake George. Some minor damage (MM VI) was reported at Cripple Creek and Royal Gorge.

March, April, and November 1981 – On April 2nd a sharp earthquake, magnitude 4.1, occurred that was centered approximately 12 miles north of downtown Denver in the Thornton area. Some slight damage (MM VI) was observed at Commerce City and Thornton. The quake was felt in other parts of Adams County and in parts of Arapahoe, Boulder, Clear Creek, Denver, Douglas, Jefferson, Gilpin, and Weld Counties. This earthquake was preceded by a small tremor located in the same area on March 24 at 6:04 a.m. MST with magnitude 2.8. It was felt in the Commerce City and Northglenn-Thornton area. The north-central part of Colorado experienced a small earthquake on September 16, 1981 at 1:59 p.m. MDT. The magnitude 2.1 tremor was located in the Commerce City-Thornton area and was felt by a few people in that area.

November 1, 1981 - A minor but alarming earthquake occurred in Jefferson County on November 1, 1981, at 8:03 p.m. MST. The magnitude 3.1 tremor was centered in the Evergreen area about 22 miles southwest of Denver. The effects registered MM V, and were experienced in the Conifer, Evergreen, and Pine Junction areas. It was also felt in other parts of Jefferson County and in parts of Clear Creek and Park Counties.

March and September 1982 – On March 11, 1982 at 4:55 p.m. MST a very minor 2.8 magnitude earthquake occurred. It was located about 12 miles north of downtown Denver in the Thornton area. It was felt in the Commerce City, Northglenn, and Thornton areas. MM III effects were experienced in the Thornton area. On September 18 at 10:12 a.m. MDT, a small part of the north-central part of Colorado was shaken by a very minor earthquake. The magnitude 2.8 tremor was located about 12 miles north of downtown Denver in the Thornton area. MM III effects were noted at Thornton; it was also felt at Commerce City and Northglenn.

February 25, 1984 at 2:18 a.m. MDT - A very minor earthquake occurred in the Denver metropolitan area. This magnitude 2.5 tremor was located about 13 miles north of downtown Denver in the Thornton area where it was felt lightly.

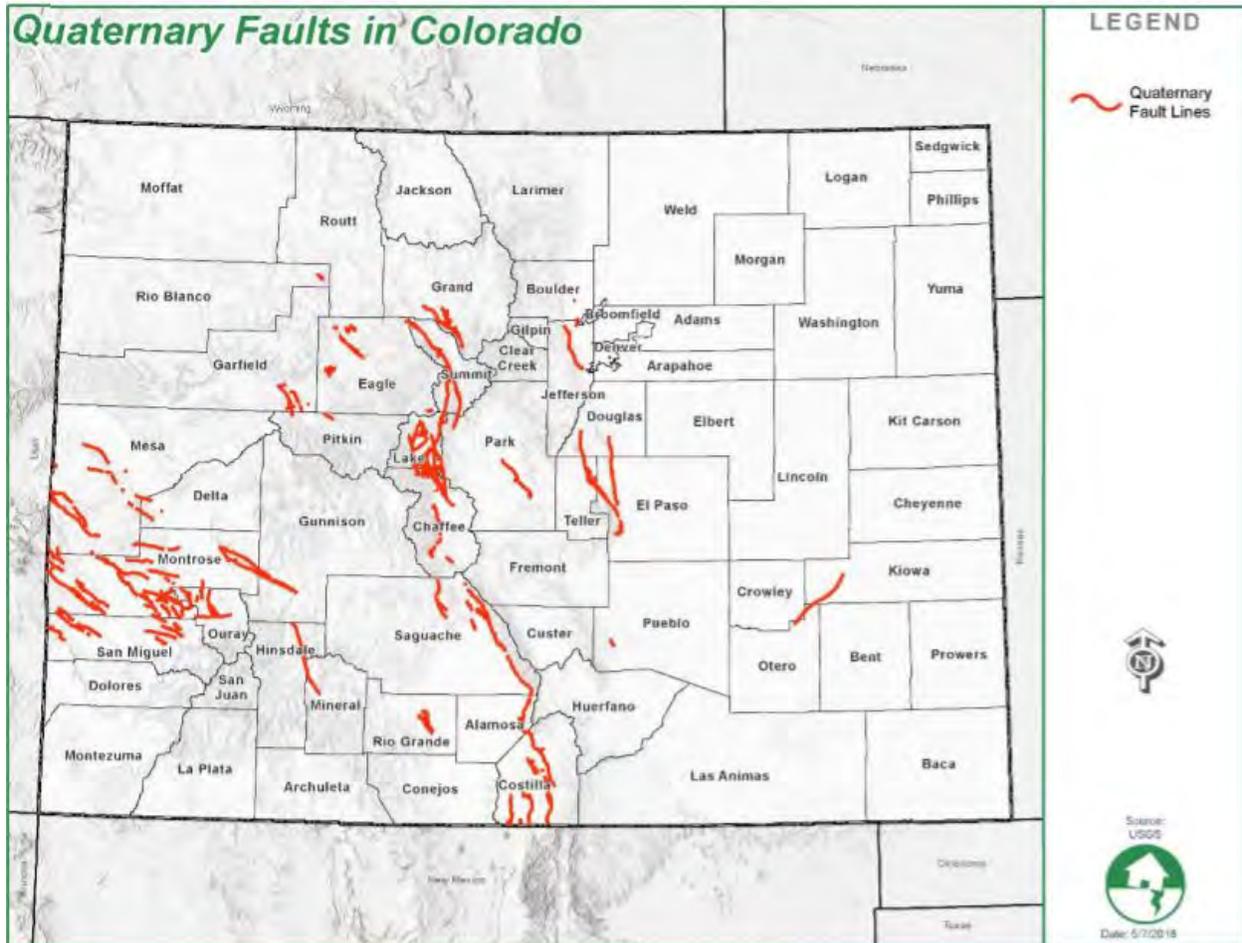
November 8, 1989 at 7:24 a.m. MDT - A minor earthquake with a magnitude of 2.5 was felt in the northern Denver metropolitan area. The shock was felt at different intensities in several location, MM IV at Thornton and MM III at Eastlake, Montbello, Northglenn and in parts of Denver. A small aftershock, ML 1.8, occurred about 90 seconds later.

December 25, 1994 12:06 p.m. MDT - A moderate earthquake with an epicenter approximately 6 miles southeast of Castle Rock struck the central front range. With a magnitude of 4.0 and a maximum Modified Mercalli intensity of V, the shock was felt from Colorado Springs to Denver. No further information available.

Geographic Extent

Geological research indicates there are about 100 potentially active faults in Colorado with documented movement within the last 2.6 million years (Quaternary). Figure 4-14 indicates that potentially active faults exist in the vicinity of Jefferson County that are capable of producing damaging earthquakes. There could be other faults in the state that may have potential for producing future earthquakes that are not known to be hazardous or do not rupture the ground surface.

Figure 4-14 Colorado Quaternary Fault Map



Source: State of Colorado Natural Hazard Mitigation Plan, 2018

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

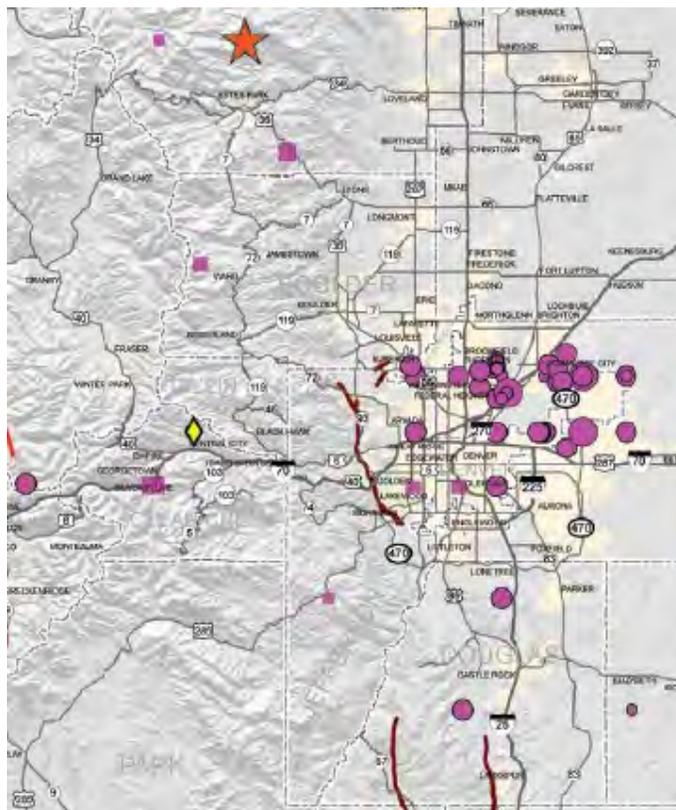
- H—Holocene (within past 15,000 years)
- LQ—Late Quaternary (15,000-130,000 years)
- MLQ—Middle to Late Quaternary (130,000 - 750,000 years)
- Q—Quaternary (approximately past 2.6 million years)

Faults with evidence of movement in the past 130,000 years (Late Quaternary) are considered active faults. Faults that last moved between 130,000 and 1.8 million years ago may be considered potentially active. These active and potentially active faults are thought to be the most likely source for future earthquakes (Source: 2018 Colorado State Hazard Mitigation Plan). The only known potentially active fault in Jefferson County is the Golden Fault, which is a Quaternary fault. This fault runs along the base of the foothills west of Golden, roughly paralleling Highway 93 from Highway 72 to the north down to Highway 285 near Morrison, and is shown on the map in Figure 4-14, which is taken from a statewide map of Colorado earthquake hazards developed by the Colorado Geological Survey. The fault runs through sparsely developed sections of western Arvada, Golden, western Lakewood, and just east of Morrison. According to the Colorado Earthquake Evaluation Report associated with the Colorado Hazard Mitigation Plan the fault is thought to be capable of producing a M6.5 earthquake. The Colorado Late Cenozoic Fault, Fold, and Earthquake Database considers this a “suspect feature” that has not shown evidence of movement in the past 500,000 years, and that definitive evidence of Quaternary movement is

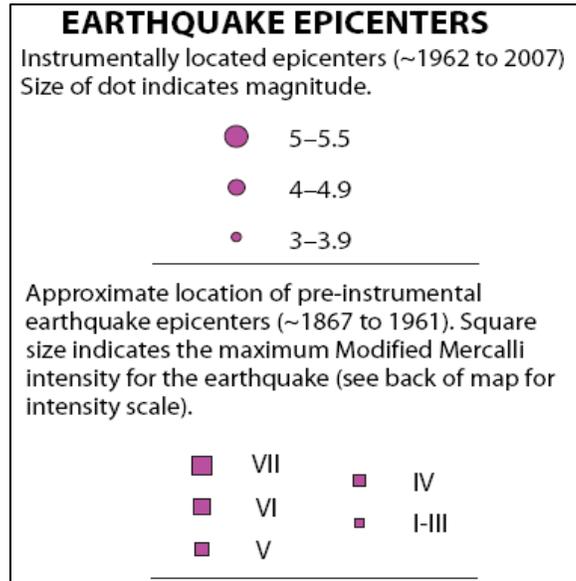
lacking. Many of these faults and historic epicenters are also shown in Figure 4-15 below, which provides a focused view of Jefferson County.

In addition to the Golden Fault there are potentially active faults to the north (Walnut Creek (Q) and Valmont (MLQ), Rock Creek (Q) in Boulder County), east (Rocky Mountain Arsenal Fault (H) in Adams County), and south (Ute Pass (MLQ) in Douglas County) of the County. The Golden, Ute Pass, and Walnut Creek faults, all which could affect Jefferson County, are three of the state's five potentially most damaging faults, according to the Earthquake Evaluation Report. The Walnut Creek Fault is in unincorporated Jefferson and Boulder Counties near Rocky Flats. In addition to these faults there is a fault suspected to be located beneath the Rocky Mountain Arsenal, which has been the source of damaging earthquakes in the Denver metro area and is considered by the Colorado Geological Survey to have the potential of producing a magnitude 6.25 earthquake. This fault is not shown on the map because it is not evident on the earth's surface.

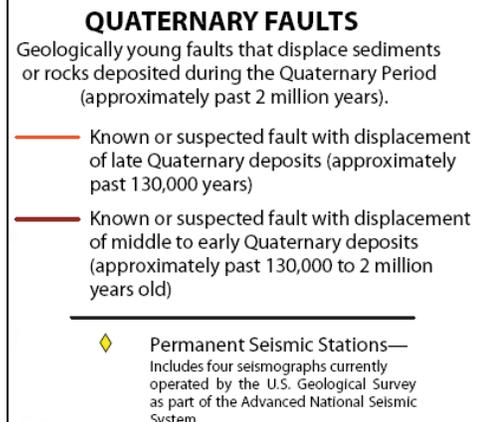
Figure 4-15 Colorado Earthquake Fault Map- Jefferson County Excerpt



Source: Colorado's Earthquake and Fault Map, Colorado Geological Survey 2008



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



Based on this information, the geographic extent rating for earthquake is **significant**.

Probability of Future Occurrences

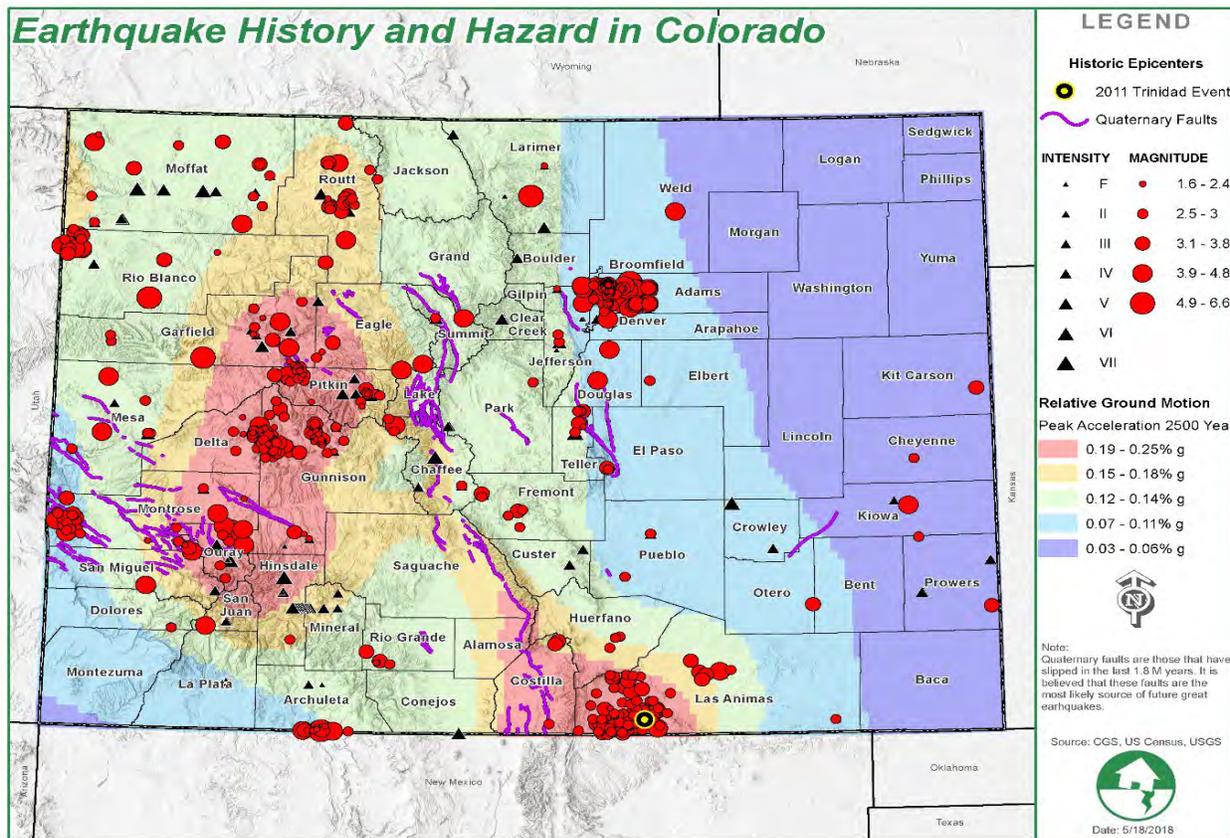
According to the Colorado Geological Survey, it is not possible to accurately estimate the timing or location of future dangerous earthquakes in Colorado because the occurrence of earthquakes is relatively infrequent in the state, and the historical earthquake record is relatively short (only about 145 years). It is prudent to expect future earthquakes as large as magnitude 6.6, the largest historical event in Colorado. Studies indicate earthquakes as large as 7.25 could occur

within the state, but scientists are unable to accurately predict when and where it will occur (Source: Colorado Earthquake Hazards – Colorado Earthquake Mitigation Council 2008.)

National seismic hazard zone maps indicate the probability of earthquakes in the United States, based on analyses of faults, soils, topography, and past events. Figure 4-16 is a probabilistic seismic hazard map of Colorado from the USGS that depicts the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed for a particle at ground level that is moving horizontally because of an earthquake). Figure 4-16 represents the 2,500-year probability ground motion, which is more of a worst-case scenario, and depicts the shaking level that has a 2 percent chance of being exceeded over a period of 50 years. In this scenario, Jefferson County lies in the range of 10-14 and 14-20 percent peak acceleration. Ground motions become structurally damaging when average peak accelerations reach 10 to 15 percent of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity Scale is about VII (18-34 percent peak ground acceleration), which is considered to be very strong (general alarm; walls crack; plaster falls).

Thus, probability for an earthquake producing minor shaking is considered **occasional**, and an earthquake causing significant damage is **unlikely**, with less than a 1 percent chance of occurrence over the next 100-year period.

Figure 4-16 Colorado Seismic Hazard Map—2% Probability of Exceedance in 50 Years



Source: Colorado State Hazard Mitigation Plan 2018

Magnitude and Severity

Earthquakes in or near Jefferson County are low probability but potentially high consequence events. The primary earthquake hazard in Jefferson County includes strong ground shaking, which could affect the entire County. It is prudent to expect future earthquakes as large as magnitude 6.6, the largest historical event in Colorado. Studies indicate earthquakes as large as 7.25 could occur within the state, but

scientists are unable to accurately predict when and where it will occur (Source: Colorado Earthquake Hazards – Colorado Earthquake Mitigation Council 2008.) While structural damage could result to buildings, damage to non-structural building elements and contents will account for the majority of damages. A 6.5 earthquake has the potential to cause multiple fatalities and injuries. The general perception is that earthquakes don't happen in Colorado, thus the populace is ill-prepared for what to do when one occurs. There is also potential for rupture of the ground surface, which could happen along a fault trace. Though a remote possibility, the potential for fault rupture would be most likely along the Golden Fault, in the vicinity of Golden along the base of the foothills. Fault rupture could impact homes and highways in west Golden. Secondary earthquake hazards that could occur in western Jefferson County and near Golden include landslides and rockfall, which could potentially damage transportation infrastructure, property, and cause death or injury. There is also the potential for damaging large waves called seiches that can form in lakes during earthquakes. This could impact reservoirs such as Chatfield, Strontia Springs, and Cheeseman, potentially causing damage to the marina and property at Chatfield.

During the development of this mitigation plan, HAZUS-MH was used to model the consequences of a large earthquake in Jefferson County. The results of this analysis are presented in the Vulnerability Assessment subsection below. This analysis complements HAZUS-MH studies performed by the Colorado Geological Survey on various faults statewide. According to those studies Jefferson County ranks 2nd in the state, behind El Paso County, as having the highest earthquake risk while comparing potential for economic loss and casualties. Considering a worst case scenario, the potential magnitude/severity rating of earthquakes is **catastrophic**, with widespread property damage, shutdown of facilities for more than two weeks and/or multiple fatalities.

Climate Change Considerations

According to the Colorado State Hazard Mitigation Plan, the best available data does not indicate that climate change is expected to influence future earthquake events in the planning area.

Vulnerability Assessment

As noted above, earthquakes strike with little to no warning and can have multiple impacts on an area. After-effects from an earthquake can include impacted roadways, downed power and communication lines, fires, and damages to structures (especially poorly built, or those already in disrepair).

The most appropriate risk assessment methodology for seismic hazards involves scenario modeling using FEMA's HAZUS loss estimation software. HAZUS is a regional earthquake loss estimation model developed by FEMA and the National Institute of Building Science. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake loss at a regional scale. HAZUS is a very useful planning tool because it provides a standard method for estimating earthquake damage, loss of function of infrastructure, and casualties, among many other factors. There are three levels of HAZUS analysis, from Level 1, which uses the default FEMA-derived datasets and damage functions, to Level 3, which uses independently compiled and accurately verified structure and infrastructure inventories and damage functions. A summary of the total loss estimations as a result of the HAZUS-MH analysis can be found below in Table 4-28.

Traditionally, earthquakes have not been considered a very likely hazard for Front Range communities and, as such, it is unlikely that many structures are built to be earthquake-resistant. All structures in the planning area are potentially exposed to damage from an event, with older or historic structures more at risk. Damage potential will vary by the size, extent, and severity of the earthquake and the location of the event's epicenter. The entire population of the planning area may also be considered at risk, and likely unprepared for earthquakes. The population at risk will vary based on the timing of a large earthquake.

Table 4-27 illustrates the potential earthquake losses in and around Jefferson County as compiled by the Colorado Geological Survey (CGS) Earthquake Reports, issued in 2013. The fatalities totals assume the quake occurs at 5:00pm. Economic impacts include both direct and indirect losses.

Table 4-27 Potential Earthquake Losses in Front Range by Fault

Fault/Magnitude	Casualties	Total Economic Loss
Inside Jefferson County		
Golden M6.5 Arbitrary	1,606	\$45 Billion
Walnut Creek M6.5 CEUS	2,303	\$60.5 Billion
Near Jefferson County/Front Range		
Chase Gulch M6.75	38	\$4.4 Billion
Mosquito M7.0 Arbitrary	125	\$8.04 Billion
Rampart M7.0 Arbitrary	743	\$28 Billion
Rocky Mountain Arsenal M6.25	1,263	\$39.9 Billion
Ute Pass M7.0 Arbitrary	594	\$22.3 Billion
Valmont M5.0 Arbitrary	22	\$2.9 Billion

Source: Earthquake Evaluation Reports, <http://coloradogeologicalsurvey.org>

According to the CGS reports, the Rocky Mountain Arsenal, Golden, Rampart Range, Ute Pass, and Walnut Creek faults are considered the top five potentially most damaging faults in the state (which includes damage to Jefferson as well as other counties in the Denver Metropolitan Area). Figure 4-14 shows the relative location of these faults.

A Level 1 HAZUS-MH earthquake loss analysis was conducted for this plan update, based on an inventory database compiled at a national level aggregated to Census Tracts. As with any model there are uncertainties, and the results should be considered approximate for planning purposes.

To evaluate potential losses associated with earthquake activity in the planning area, a HAZUS 2,500-year probabilistic scenario was run for the entire County. The methodology utilizes probabilistic seismic hazard contour maps developed by the U.S. Geological Survey (USGS).

During the update of this plan in 2021, a HAZUS-MH probabilistic earthquake scenario was run with the latest version of HAZUS-MH (Version 2.2). A driving Magnitude of 7.25 was input into the HAZUS scenario, but the results are primarily based on the USGS 2,500 year probabilistic ground shaking maps. The USGS maps provide estimates of potential ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively.

The 2,500-year return period analyzes ground shaking estimates with a 2 percent probability of being exceeded in 50 years, from the various seismic sources in the area. The International Building Code uses this level of ground shaking for building design in seismic areas. The CGS believes that the USGS probabilistic shaking maps likely underestimate the hazard, as there are limited studies of the earthquake hazard in the state to base the shaking maps on. Table 4-28 summarizes the results of the 2,500-year HAZUS-MH scenario. A 100-year return period scenario was also analyzed. This scenario did not produce any damage.

Table 4-28 HAZUS-MH Earthquake Loss Estimation 2,500-Year Scenario Results

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 25,355 Moderate: 10,355 Extensive: 2,004 Complete: 118

Type of Impact	Impacts to County
Building and Income Related Losses	\$1.7 Billion 65% of damage related to residential structures 17% of loss due to business interruption
Total Economic Losses (includes building, income and lifeline losses)	\$2.2 Billion Building: \$1.41 Billion Income: \$295.4 Million Transportation/Utility: \$4.6 Million
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 177 Requiring hospitalization: 22 Life threatening: 2 Fatalities: 3
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 307 Requiring hospitalization: 46 Life threatening: 4 Fatalities: 8
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 223 Requiring hospitalization: 33 Life threatening: 3 Fatalities: 5
Damage to Transportation and Utility Systems and essential facilities	No transportation or pipeline damage, 0 essential facilities damaged
Fire Following Earthquake	0 Ignitions 0.00 sq. miles burnt
Debris Generation	416,000 million tons of debris generated 16,640 truckloads
Displaced Households	826
Shelter Requirements	437

Source: HAZUS-MH 2.2

Another HAZUS-MH earthquake scenario is included in this analysis. The Colorado Geologic Survey produced a report for a M6.5 event on the Golden Fault as it is presumed to be the most damaging to Jefferson County based on its proximity to the City of Golden and the Jefferson County governmental offices, including the Emergency Operations Center (EOC). The epicenter, or point on the ground surface where the earthquake originates, was chosen at an arbitrary location on the fault at -105.22 longitude and 39.75 latitude, just south of the community of Beverly Heights in Golden, along US Highway 6.

The model assumed the following fault rupture parameters: depth of 10km, rupture orientation of 157 degrees and a West US Extensional 2008 attenuation function. Table 4-29 summarizes the output from this 'worst case' scenario for Jefferson County.

Table 4-29 HAZUS-MH Earthquake Loss Estimation Golden Fault M 6.5 Scenario Results

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 48,908 Moderate: 35,760 Extensive: 17,176 Complete: 6,629

Type of Impact	Impacts to County
Building and Income Related Losses	Total: \$11.5 Billion 60% of damage related to residential structures 20% of loss due to business interruption
Total Economic Losses (includes building, income and lifeline losses)	Total: \$11.5 Billion Building: \$8.3 Billion Income: \$2.1 Billion Lifeline: \$1.2 Billion
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 2,218 Requiring hospitalization: 578 Life threatening: 88 Fatalities: 172
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 4,516 Requiring hospitalization: 1,297 Life threatening: 213 Fatalities: 415
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 3,191 Requiring hospitalization: 908 Life threatening: 169 Fatalities: 284
Damage to Transportation Facilities and essential facilities	Total Transportation Replacement Value: \$3.5 Billion 34 essential facilities damaged with functionality > 50% on Day 1
Fire Following Earthquake (Monte Carlo Simulation)	0 ignitions 0.0 sq. miles burned
Debris Generation	3.73 million tons of debris generated 149,080 truckloads
Displaced Households	11,616
Shelter Requirements	6,086

Source: HAZUS-MH 2.2

General Property

There are an estimated 197,000 buildings in Jefferson County with a total building replacement value (excluding contents) of \$66.7 Billion. Approximately 92% of these buildings (and 82% of the building value) are associated with residential housing. In terms of building construction types found in the region, wood frame construction makes up 70% of the building inventory. The remaining percentage is distributed between the other general building types.

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents.

The categories of damages defined by HAZUS are:

- **Slight** damage includes diagonal hairline fractures on most shear wall surfaces and hairline cracks on most infill walls.
- **Moderate** damage includes cracks on most walls and failure of some shear walls.
- **Extensive** damage means that most shear wall surfaces in the structure have reached or exceeded their capacity exhibited by large, through-the-wall diagonal cracks.
- **Complete** damage means that the structure has collapsed or is in danger of collapse.

In the probabilistic scenario, HAZUS estimates that about 12,477 buildings will be at least moderately damaged, of these an estimated 118 buildings will be damaged beyond repair. This leads to over 6% of the total number of buildings in the County being at least moderately damaged. Most of the damage modeled as extensive and complete is associated with unreinforced masonry buildings. Losses by type for this scenario, both in the type of loss (i.e. structural, wages, income, etc.) and occupancy type, are detailed further in Figure 4-17.

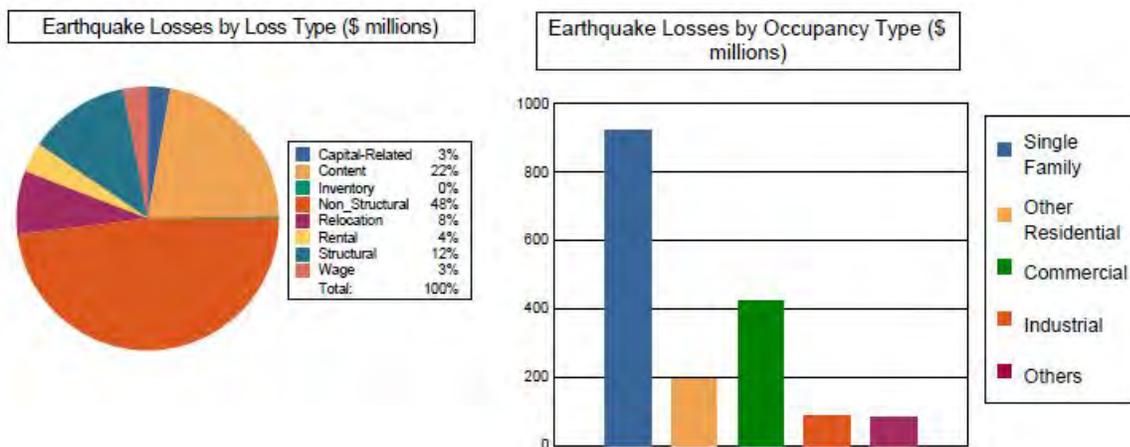
The total building-related losses in this scenario were \$1.7 billion, with detail shown in Table 4-30. By far, the largest loss was sustained by the residential occupancies which made up over 65% of the total loss.

Table 4-30 Building-Related Economic Loss Estimates in Millions of Dollars – 2,500 Year Probabilistic Scenario

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	2.1614	45.5558	1.8342	3.5963	53.1477
	Capital-Related	0.0000	0.9199	43.5063	1.1226	0.6431	46.1919
	Rental	19.9095	10.9176	27.8553	0.7209	1.6131	61.0164
	Relocation	70.7959	8.5331	40.1474	4.5635	10.9656	135.0055
	Subtotal	90.7054	22.5320	157.0648	8.2412	16.8181	295.3615
Capital Stock Losses							
	Structural	122.0547	19.1404	47.5426	10.9099	11.3541	211.0017
	Non_Structural	495.4731	117.3821	135.3296	36.9199	31.3129	816.4176
	Content	212.2252	36.0274	81.5750	25.1596	20.1904	375.1776
	Inventory	0.0000	0.0000	1.7881	4.6542	0.3039	6.7462
	Subtotal	829.7530	172.5499	266.2353	77.6436	63.1613	1409.3431
	Total	920.46	195.08	423.30	85.88	79.98	1704.70

Source: HAZUS-MH Global Summary Report, Wood analysis

Figure 4-17 Earthquake Losses by Type – 2,500 Year Probabilistic Scenario



The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake. 17% of the estimated losses were related to business interruption.

For the Golden Fault deterministic scenario, HAZUS estimates much more extensive damage with about 59,565 buildings at least moderately damaged and 6,629 of these buildings damaged beyond repair. This is over 30% of the total number of buildings in the County at least moderately damaged. Most of the

damage modeled as extensive and complete is associated with masonry buildings, both reinforced and unreinforced.

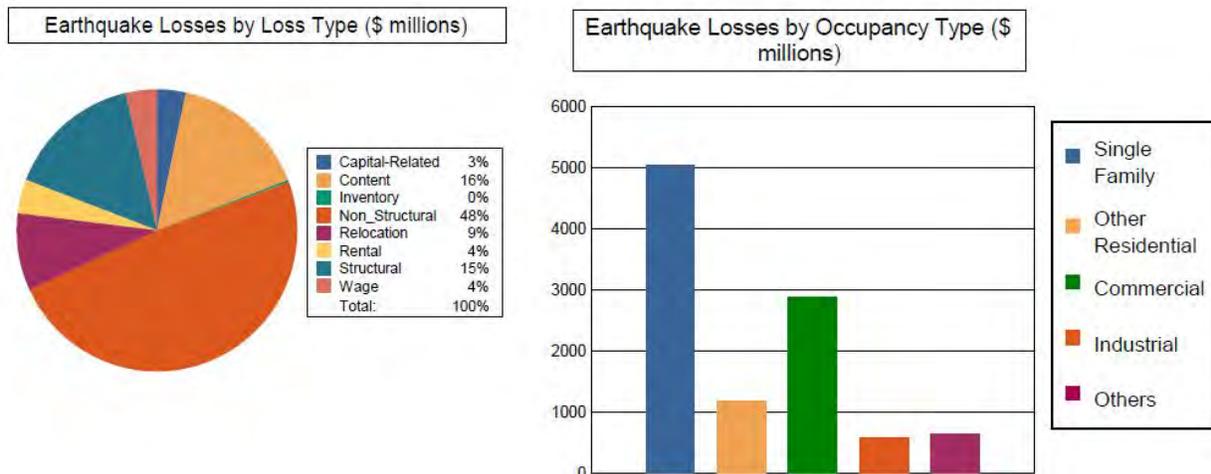
The total building-related losses in this scenario were \$10.3 billion, with detail shown in Table 4-30. By far, the largest loss was sustained by the residential occupancies which made up over 65% of the total loss. Earthquake losses for the Golden Fault scenario by type, both in the type of loss (i.e. structural, wages, income, etc.) and occupancy type, are detailed further in Figure 4-18.

Table 4-31 Economic Loss Estimates in Millions of Dollars – M6.5 Golden Fault Scenario

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	18.8614	321.8556	13.1289	28.9066	382.7525
	Capital-Related	0.0000	8.0303	318.0109	8.1135	5.2837	339.4384
	Rental	143.7674	79.0565	170.5806	4.3559	14.1979	411.9583
	Relocation	500.7302	53.1115	252.0721	23.3202	90.8138	920.0478
	Subtotal	644.4976	159.0597	1062.5192	48.9185	139.2020	2054.1970
Capital Stock Losses							
	Structural	896.2019	144.3440	373.7022	84.0864	95.8819	1,594.2164
	Non_Structural	2758.7286	710.8701	1005.2295	260.7901	266.4793	5,002.0976
	Content	756.6651	161.3783	433.2579	159.2894	122.4645	1,633.0552
	Inventory	0.0000	0.0000	9.4733	28.8443	1.3308	39.6484
	Subtotal	4411.5956	1016.5924	1821.6629	533.0102	486.1565	8269.0176
	Total	5056.09	1175.65	2884.18	581.93	625.36	10323.21

Source: HAZUS-MH Global Summary Report, Wood analysis

Figure 4-18 Earthquake Losses by Type – M6.5 Golden Fault Scenario



People

Potential fatalities and injuries are described above in the HAZUS results. Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking. HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four severity levels that describe the extent of the injuries. The levels are described as follows:

- **Severity Level 1:** Injuries will require medical attention, but hospitalization is not needed.

- **Severity Level 2:** Injuries will require hospitalization but are not considered life-threatening.
- **Severity Level 3:** Injuries will require hospitalization and can become life threatening if not promptly treated.
- **Severity Level 4:** Victims are killed by the earthquake.

The casualty estimates are provided for three times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is at its maximum. The 2:00 PM estimate considers that the educational, commercial, and industrial sector loads are at their maximum. The 5:00 PM represents peak commute time. The models show that for both scenarios the 2:00 PM event time would result in the most casualties. In the probabilistic scenario, most of these would be minor injuries (307 Level 1 and 46 Level 2), and 4 hospitalizations (Level 3) and 8 fatalities (Level 4) are estimated. In the M 6.5 Golden Fault event, the casualty numbers are estimated to be significantly higher, with 4,516 Level 1 and 1,297 Level 2 casualties, 213 hospitalizations, and 415 fatalities.

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates that approximately 826 households will be displaced due to the earthquake, and 437 people will seek temporary shelter in public shelters. The Golden Fault scenario would result in an estimated 11,616 displaced households and 6,086 individuals seeking temporary shelter.

Critical Facilities and Infrastructure

HAZUS breaks critical facilities into two groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

The model estimates the region has 6 hospitals with 780 hospital beds total. The probabilistic scenario estimates that on the day of the earthquake only 566 (73%) would be available for use. After one week 88% of the beds will be back in service. The model did not predict there would be any damage to schools, police, fire stations, or EOCs.

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are 7 transportation systems that include highways, railways, light rail, bus, ports, ferry, and airports. The transportation systems inventory includes over 280.24 miles of highways and 447 bridges. The probabilistic scenario estimated approximately \$4.6 million in damage to transportation systems, mostly to highways, bridges, and bus facilities.

There are 6 utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power, and communications. The inventory value of the utility lifeline systems combined is estimated to be \$6.1 billion including 13,106 miles of pipes, and related economic losses to these systems in the probabilistic scenario would be around \$486.6 million, with the largest losses to wastewater and electrical power systems.

The expected utility system facility damages in terms of Economic losses in millions of dollars are found in Table 4-32.

Table 4-32 Utility System Economic Losses in Millions of Dollars

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	161.5050	12.7520	7.90
	Distribution Lines	210.9119	0.8434	0.40
	Subtotal	372.4169	13.5954	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	3783.9140	332.7814	8.79
	Distribution Lines	126.5471	0.4237	0.33
	Subtotal	3910.4611	333.2051	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	84.3648	0.1452	0.17
	Subtotal	84.3648	0.1452	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0970	0.0084	8.66
	Subtotal	0.0970	0.0084	
Electrical Power	Facilities	1697.0281	139.4595	8.22
	Subtotal	1697.0281	139.4595	
Communication	Facilities	2.4250	0.2037	8.40
	Subtotal	2.4250	0.2037	
Total		6,066.79	486.62	

The Golden Fault scenario estimates that on the day of the earthquake only 240 hospital beds (31%) would be available for use. After one week 52% of the beds will be back in service. The model predicted that 3 hospitals, 126 schools, 5 EOCs, 14 police stations, and 20 fire stations would be at least moderately damaged but with > 50% functionality from the event. These figures make up 49% of the county's essential facilities. The model further estimates that 10 essential facilities would be completely damaged.

The model estimates the Golden Fault scenario would result in \$50.55 million in economic losses to the transportation lifelines and \$1.1 billion in losses to utility lifelines.

Economy

The 2,500 year probabilistic scenario estimates a total economic loss for the earthquake at \$2.2 billion, which includes building and lifeline related losses based on the County's available inventory. \$295.4 million is estimated to result from business interruption.

The M 6.5 Golden Fault scenario results in \$11.5 billion in total economic losses for the county, including building and lifeline losses.

Historical, Cultural, and Natural Resources

Earthquake effects on the environment, natural resources, and historic and cultural assets would likely be minor. The biggest impact would likely be on the older historic properties constructed with unreinforced masonry.

Future Development

Without earthquake-resistant building considerations, future development will exhibit similar exposure and vulnerability to earthquakes as existing structures. As the region continues to expand, the overall estimated costs of a significant earthquake, both fiscally and in terms of casualty rates, may be expected to rise.

Overall Hazard Significance

Earthquakes in Jefferson County can impact the entire planning area. Within Colorado's relatively short historic record, earthquakes have been limited mainly and generally low in magnitude and/or intensity. The geographic extent of the hazard is considered **significant**. The probability of future large magnitude occurrences is considered **unlikely** (less than 1 percent probability of occurrence), though the magnitude/severity for a worst-case scenario is **catastrophic**. In addition, the HMPC considers the hazard to have a **high** overall impact on the County. While this lends itself to an overall ranking of high, the likelihood of an earthquake event that causes damages and significant impacts on the planning area is extremely low. Furthermore, mitigation activities for the planning area are very expensive and, according to stakeholder input, prohibitive in both timeframe for implementation and overall expense. As such the hazard is rated as **medium**.

4.3.6 Erosion and Deposition

Description

Erosion is the removal of solids (sediment, soil, rock and other particles) in the natural environment. It usually occurs due to transport by wind, water, or ice; by down-slope creep of soil and other material under the force of gravity; or in the case of bioerosion by living organisms such as burrowing animals. Erosion is distinct from weathering, which is the process of chemical or physical breakdown of the minerals in the rocks, although the two processes may occur concurrently.

The rate of erosion depends on many factors. Climatic factors include the amount and intensity of precipitation, freeze-thaw cycles, seasonality, the wind speed, and storm frequency. The geologic factors include the sediment or rock type, its porosity and permeability, the slope of the land, and whether the rocks are tilted, faulted, folded, or weathered. The biological factors include ground cover from vegetation or lack thereof, the type of organisms inhabiting the area, and the land use. Areas with high-intensity precipitation, more frequent rainfall, more wind, freeze-thaw cycles, or more storms are expected to have more erosion. Sediment with high sand or silt contents and areas with steep slopes erode more easily, as do areas with highly fractured or weathered rock. The porosity and permeability of the sediment or rock also affect how fast water can percolate into the ground. If the water moves underground, less runoff is generated, reducing the amount of surface erosion. Sediments containing more clay tend to erode less than those with sand or silt.

Grus soils form as a result of weathering of granites with abundant feldspar, such as the Pikes Peak Granite present in southwestern foothills of Jefferson County. The result is similar to 'kitty litter', which can easily be eroded and transported by wind and rain. Problems result from both erosion and deposition of these soils, particularly in areas burned by recent wildfires. Generally, land underlain by grus is gently rolling.

Changes in the kind of vegetation in an area can also affect erosion rates. Different kinds of vegetation lead to different infiltration rates of rain into the soil, and different surface runoff flow speeds. For example, forested areas have higher infiltration rates, so precipitation will result in less surface runoff, thus less erosion. If the trees are removed, for example by fire or logging, infiltration rates become high, but erosion can remain low to the degree that the forest floor remains intact. It is the removal of, or compromise to, the forest floor, not the removal of the canopy, which leads to increased erosion.

Poor land use practices can also lead to increased erosion. Some of those practices include deforestation, overgrazing, unmanaged construction activity and road-building. Land that is used for the production of agricultural crops generally experiences a significantly greater rate of erosion than that of land under natural vegetation. In the case of construction or road building, when the litter layer is removed or compacted, the susceptibility of the soil to erosion is greatly increased and the process, without proper engineering, can significantly change drainage patterns. There has been a marked increase in recreational land use that has left erosive remnants. The County Land Development Regulations, Section 17 addresses requirements for erosion and sediment control for new developments, refer to Section 2 Capabilities Assessment for further details. Large numbers of hikers use trails leaving furrowed foot traffic, or extensive use of off-road vehicles leave paths of beaten down vegetation and gouged terrain. There is a potential for the impacts of "beetle kill" to negatively affect soil stability and lead to erosion and watershed degradation as well. As discussed in Section 4.3.16 Wildfire, these predictions are difficult to quantify the impacts have not yet occurred, though the precedence is set. Future evaluation on the impacts of beetle kill on erosion may be merited in future planning efforts. While a certain amount of erosion is natural and, in fact, healthy for the ecosystem, wise land use practices are also necessary to keep it balanced.

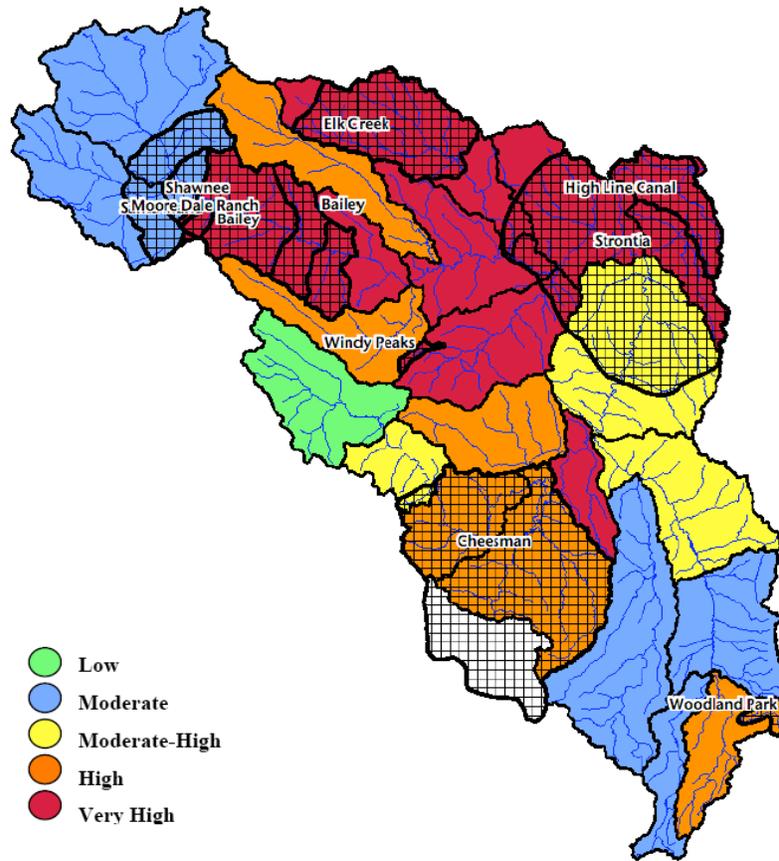
Geographic Extent

Determining erosion vulnerability for the planning area is difficult at best. Theoretically, areas of potential erosion due to human-exacerbated conditions, such as construction sites, are temporary and move around frequently as the County undergoes normal ebbs and flows in development.

Forested areas in the foothills of Jefferson County, which account for over 50% of the planning area, are potentially vulnerable to erosion problems after severe wildfires.

The Front Range Watershed Protection Data Refinement Work Group has developed a technical approach to protecting watersheds from post wildfire erosion. The purpose of this group is to identify and prioritize those watersheds that provided or convey water used by communities and municipalities. The data analysis is designed to identify and prioritize watersheds for hazard reduction treatments or other watershed protection measures. Through GIS analysis of soil erodibility, water uses, wildfire hazard, and flood or debris flow risk hazardous watersheds have been identified. Many of these are within Jefferson County are displayed on the following map. The source water area upstream from important surface water intakes, upstream diversion points, and classified drinking water supply reservoirs that have a higher potential for contributing significant sediment or debris is referred to as the Zone of Concern, and is mapped in Figure 4-19.

Figure 4-19 Upper South Platte Zones of Concern and Watershed Prioritization Map



Source: Front Range Watershed Protection Data Refinement Workgroup Executive Summary

Finally, the natural geologic formations found in the planning area, and specifically the sides of North and South Table Mountain, Green Mountain, and the hogback formations, may be vulnerable to erosion from natural causes. In general, however, the overall extent of erosion susceptibility is fairly small.

Based on this information, the geographic extent rating for erosion is **significant**.

Previous Occurrences

Erosion occurs frequently in Jefferson County and is, in fact, a natural part of the ecosystem. Concerns about erosion arise when large amounts of sedimentation are deposited into the water supply because of erosion (generally driven by human factors) or when significant erosion occurs in wildfire burn areas, which impacts both watershed quality and recovery efforts in the burn area.

Specific incidents of development-driven erosion, or the erosion that occurs when sites undergoing development and construction are not adequately protected against erosion, are too numerous to specifically quantify. Under state, local and federal regulation, however, construction sites are required to mitigate or minimize erosion and sedimentation as far as possible, which would reduce future occurrences.

The Buffalo Creek Fire in Jefferson County in May of 1996 was followed by substantial flooding and erosion two months later. The burned area is within the Pike National Forest, in the South Platte Watershed and foothills of Jefferson County. The flooding transported approximately 331,000 m³ of coarse sediment into Strontia Springs Reservoir in three months after the fire. This reservoir supplies over 75% of the drinking water to the City of Denver. Studies indicate the sedimentation rate was nearly 30 times the annual rate of sediment input used in designing the reservoir. The reservoir also experienced a significant degradation in water quality as a result of the input of burned material and sediment. Denver Water, the agency responsible for distributing drinking water from the reservoir, estimates that it spent over \$1 million in immediate clean-up efforts after the fire. Denver Water is in the process of dredging excess sediment from the reservoir, at an estimated cost of \$23 million.

The 2002 wildfire season, detailed in the wildfire hazard profile, was unusually severe in terms of both the number and extent of wildfires the state experienced, and the severity of the lasting impacts of those fires. Unlike the 1996 Buffalo Creek post-fire recovery time, localized extreme flooding and substantial erosion and deposition that pose significant hazards to the public have continued to 2009; the potential for more flooding and erosion and will likely continue for several more years, particularly in and near the community of West Creek and on Six Mile Creek near Deckers. In 2009, seven years after the fire, Vail Resorts, the U.S. Forest Service, and the National Forest Foundation announced plans to raise \$4 million to undo damages caused by the Hayman fire, including watershed cleanup, restoration of burned lands, and rebuilding of recreational trails. This project was successfully completed over three years between 2011 and 2013. Based on the lessons learned from the Buffalo Creek Fire, Denver Water installed sediment traps on Turkey Creek to protect Cheesman reservoir from siltation, at a cost of \$2 million. These sediment traps require periodic mucking out, which costs about \$350,000 each time, but should mitigate more expensive dredging operations at the reservoir in addition to water quality impacts.

The Coal Creek Watershed suffered a heavy rainfall event on September 12, 2013 that caused large amounts of channel migration that resulted in erosion and deposition. Per the Upper Coal Creek Watershed Restoration Master Plan: The rainfall event on September 12, 2013, was unprecedented in the Coal Creek watershed. Damage throughout the corridor was widespread. In particular, downstream of Twin Spruce Gap Road, nearly every access culvert failed, was washed out, or was significantly damaged. The channel eroded significantly, leading to visible scour through the La Duwaik Estates and other central residential corridors. Highway culverts also plugged with debris, further exasperating flooding effects on the highway and downstream infrastructure. The culvert crossing at the Union Pacific Railroad (UPRR) did manage to pass the peak flows; however, a sedimentation zone was formed in the valley upstream of the culvert, where much of the eroded material was deposited. With the exception of the old Real Estate building at Twin Spruce Gap Road, no homes or buildings were destroyed in this area, although some were badly damaged. This building has since been demolished, and the land acquired by the Colorado Department of Transportation (CDOT).

The Coal Creek Canyon community center is located upstream of Twin Spruce Gap Road. Significant damage was also evident in this area, including structure inundation and culvert failures. Runoff from the Crescent Park Tributary eroded drainages and moved sediment through this corridor. Flood damage was widespread at both commercial and residential locations. A new channel was excavated at the intersection of Crescent Park Drive and Highway 72 to help direct discharges from the Crescent Park Tributary to Coal Creek.

Similar observations were made in the upper portions of Coal Creek and its tributaries, with damages along Twin Spruce Gap Road (Beaver Creek), Crescent Park Drive, and Ranch Elsie Road. Again, failure was noted at many driveway and access culverts, as well as damage to homes and other structures.

As with other historic flood events, highway and roadway access was limited during and after the flood event. Highway 72 reopened permanently approximately two months following the flood event. Access for

residents to and from the Front Range was very limited over this time period and required extensive detouring to otherwise nearby areas.

Following the flood event significant efforts were made (and are still ongoing) to repair the destruction. Much of the repair work, such as private culvert replacement, has been completed by individual landowners. The National Resources Conservation Services (NRCS) has also provided assistance to qualified landowners in need of immediate assistance through their Emergency Watershed Protection (EWP) program. Repair work to public infrastructure has been led by groups including Jefferson and Boulder Counties.

Along Highway 72, CDOT has been active in repairing and reopening the highway. This work has included debris removal, roadway reconstruction/resurfacing, and bank reinforcement in areas adjacent to the highway with high erosive susceptibility. Much of this initial work was an immediate response to the flood event and CDOT began flood repair and roadway improvement project along Coal Creek Canyon in April 2019 and completed in 2020. The repairs include road reconstruction of 12 miles of Highway 72, replacing culverts, stabilizing slopes and restoring channels, and adding a four-foot shoulder (CDOT 2020).

Probability of Future Occurrences

Erosion occurs daily as a natural process in both developed and undeveloped lands, and natural erosion is not considered a hazard.

Future incidents of erosion associated with wildfires are likely particularly in a mountainous area where the ground is sloping. As such, for this erosion and deposition, the probability of future occurrence mimics that of the wildfire hazard. Since 1980, there have been 23 fire incidents in Jefferson County that have burned 10 or more acres. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of erosion occurring as a result of severe wildfire in any given year is 57.5%. This corresponds to a probability of future occurrences rating of **likely**.

Magnitude and Severity

According to the *Small Site Erosion and Sediment Control Manual* published by the Jefferson County Planning and Zoning Division, stormwater runoff polluted with sediment is the main cause of surface water pollution in the United States. Furthermore, construction activities may generate 400 times the amount of erosion compared to undisturbed land, or 400 years' worth of erosion over a period of one year of construction. Erosion issues with new development should be minimal if erosion control practices are utilized.

Post-fire erosion in the foothills of Jefferson County has and will continue to cause watershed health problems. Erosion rates due to wildfires varies based on the terrain, slope, severity of the burn, subsequent rainfall until groundcover can be re-established, and the overall erodibility of the soil in question. While a methodology is still under development, the impacts of erosion into watersheds is well documented. Erosion carries sediment, organic debris, and chemicals into the water supplies, which may damage aquatic habitats and impact the water quality utilized by populations. As water is a critical resource to Jefferson County's large population, the impacts may be widespread. Erosion, therefore, could pose significant indirect impacts on the planning area, even if it does not directly impact life quality and other critical services.

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. The event of record for this hazard is the resulting erosion caused by the Buffalo Creek Fire in 1996, but the impacts have been long-range. Response and recovery costs to address erosion problems have cost Denver Water alone over \$27.7 million. Erosion may occur and damage the entire burn area, with damages inflicted on critical facilities from the loss or disruption of services, particularly if reservoirs, water treatment plants, roads, or communication lines are impacted or damaged. Erosion may cause illnesses to the watershed populations who are exposed to diminished water quality but the burden on the medical community is anticipated to be minimal. Knowledge of these

impacts is well addressed in local planning and mitigation efforts, however, which decreases the likely occurrence of these impacts.

Based on these factors, the magnitude severity rating for erosion is considered **critical**, mainly for watershed health and critical facility impacts.

Climate Change Considerations

Climate change projections show an increase of climate induced events related to in the intensity of heavy rain events which can result in increased erosion and sediment transport in local water bodies threatening to both water quality as well as the fish and aquatic vegetation the live in the streams and rivers. Higher river levels and faster stream velocity as a result of stronger, more intense storms can also increase erosion. According to the 2018 State of Colorado Hazard Mitigation Plan, the extent of erosion and deposition are expected to increase as the frequency of wildfires increase across the state. Overall, wildfire erosion is expected to increase across Colorado.

Dust-on-snow causes increased snowmelt because dust is darker than snow it absorbs more sunlight causing the snow underneath to heat up more rapidly. This is an emerging factor that could lead to substantial long-term reductions in Colorado's seasonal snow cover. The Center for Snow and Avalanche Studies (CSAS), located in Silverton, Colorado, operates the Colorado Dust-on-Snow (CODOS) program to study the effects of dust on Colorado's snowpack. The program has CSAS sensors at 11 mountain pass locations throughout the state to monitor the presence or absence of dust layers, including Grizzly Peak adjacent to Loveland Pass. As of April 30, 2019, the CODOS reported dust to be more evident and severe compared to the 10 other sites. The Rocky Mountains have been receiving dust since the ice age but the CODOS has seen evidence that the size and frequency of dust storms in the Colorado Mountains have been increasing since the 1990s.

Vulnerability Assessment

Two different areas of existing development are vulnerable to erosion. Erosion of soils due to slope grade, soil content and cover, and exposure to weather conditions is fairly limited and generally falls within underdeveloped areas. This is also due to the concurrence of erosion potential with other geologic hazard areas, such as dipping bedrock or subsidence regions, which are regulated for development by the County.

General Property

Buildings and infrastructure across the county may be vulnerable to the impacts of erosion and deposition. Although damage or losses to structures are typically minimal, there can be impacts with mitigation and maintenance costs, lost time, and minor structural damage. Areas susceptible to wildfire-driven erosion, which often result in debris flow (see below) or the erosion and deposition of soil into watersheds, also does not usually directly impact developed areas. There are some areas of variance, particularly in the wildland-urban interface, where debris flows may impact housing and commercial districts.

People

There are no reported injuries or deaths to these soil hazards in Jefferson County, and direct impacts on people are likely to be very minimal.

Critical Facilities and Infrastructure

In addition to the general areas of existing vulnerability, scour critical bridges are also vulnerable to the effects of erosion and deposition. These bridges are listed in Table 4-45. Erosion around bridges may compromise the construction of the structure, making them unsafe. Deposition may also press up against the structures, causing structural strain or sweeping out the structure by debris. In this instance, the vulnerability overlaps those identified in the debris flow section that follows.

Economy

Response and recovery costs to address erosion problems have cost Denver Water alone over \$27.7 million. This can be used as an estimate of future losses but will vary depending on if fire and resulting erosion problems affect critical watersheds.

Historical, Cultural, and Natural Resources

The largest concern surrounding erosion centers on the pollution of the watersheds by soils, which impacts wildlife balances and degrades water quality for downstream habitats. Continued erosion and movement of soils in wildfire areas usually degrade watershed quality and thus exert a larger or disproportionate impact on the larger planning area. In addition, recovery for the washed-out areas may be prolonged or difficult, as demonstrated in the burn areas of the Hayman fire, due to the loss of nutrient-rich soil.

Future Development

Future development on steep slopes is not likely, and the areas at the base of the hogbacks are regulated by the County, therefore future development exposed to slope-driven erosion is unlikely. Unsuitable slopes are mapped in area plans (such as the Evergreen Area Community Plan) and are part of the County Comprehensive Plan. Future developments subjected to erosion and deposition as a result of wildfire, forest thinning, and clearcutting are vulnerable to the same extent as discussed in the landslide, debris flow, and rockslide hazard.

Overall Hazard Significance

Erosion events in Jefferson County have a potentially significant impact on the planning area, but the County has recognized and addressed these threats. As such, the geographic extent of the hazard is considered **significant**, the probability of future occurrences is considered **likely** and the magnitude/severity for the event of record is **critical**. In addition, the HMPC considers the hazard to have a low overall impact on the planning area. This equates to an overall impact rating of **medium**.

4.3.7 Expansive Soils

Description

Swelling soils and swelling bedrock contain clay which causes the material to increase in volume when exposed to moisture and shrink as it dries. They are also commonly known as expansive, shrinking and swelling, bentonitic, heaving, or unstable soils and bedrock. In general, the term refers to both soil and bedrock contents although the occurrence of the two materials may occur concurrently or separately. The difference between the materials is that swelling soil contains clay, while swelling bedrock contains claystone. In this profile, the term is used to refer to both materials, as they are both relevant to the planning area.

The clay materials in swelling soils are capable of absorbing large quantities of water and expanding 10 percent or more as the clay becomes wet. The force of expansion is capable of exerting pressures of 15,000 pounds per square foot or greater on foundations, slabs, and other confining structures. The amount of swelling (or potential volume of expansion) is linked to five main factors: the type of mineral content, the concentration of swelling clay, the density of the materials, moisture changes in the environment, and the restraining pressure exerted by materials on top of the swelling soil. Each of these factors impact how much swelling a particular area will experience, but may be modified, for better or worse, by development actions in the area.

In Colorado, swelling soils expand and contract naturally during seasonal wetting (winter and spring) and drying (summer and fall) conditions and in their natural, undeveloped state they cause little damage. However, exposure to additional water sources, such as lawn and garden irrigation or precipitation drainage from houses, and reduced evaporation properties caused by the development of roads, sidewalks, buildings and parking lots, may cause the swelling soils to expand more than they would if they remained undeveloped. In addition, the re-grading of development areas may expose more swelling soil to moisture than the natural state, causing a more widespread swelling event.

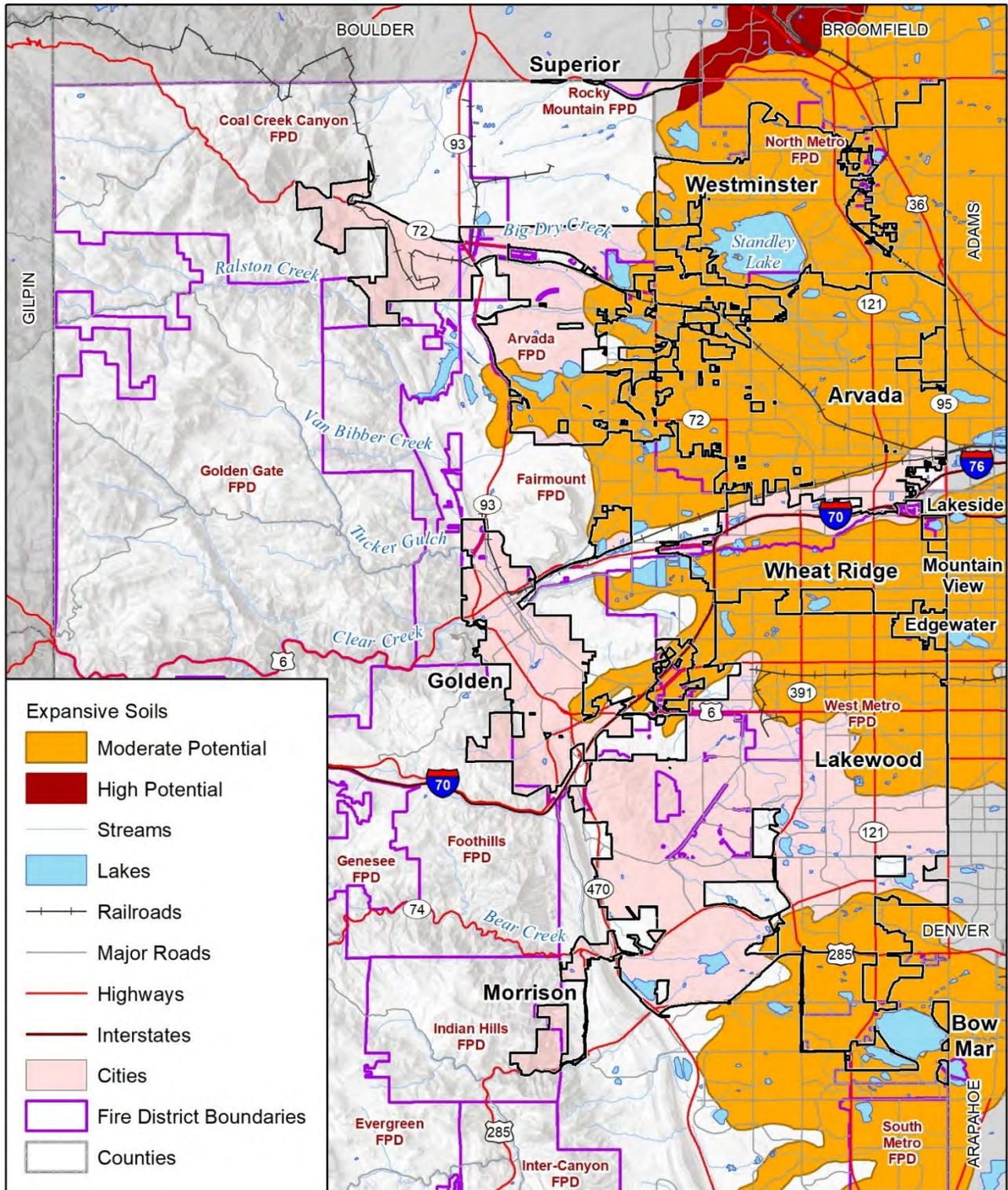
In Jefferson County, there are also areas of steeply dipping bedrock or heaving bedrock along the foothills. In these areas, sedimentary bedrock layers are steeply upturned and tilted to form the distinctive hogback features. This causes bedrock to swell unevenly in a linear pattern, instead of the uniform pattern more common to flatter areas of swelling soils, and subjects structures to extreme amounts of both vertical and lateral stress. In Jefferson County, areas of potential dipping and heaving bedrock are identified as a geologic hazard and construction in those areas is heavily restricted.

Swelling soils are one of the nation's most prevalent causes of damage to buildings. According to the 2018 State Hazard Mitigation Plan, annual losses nationwide are estimated in the range of \$2 billion. In Colorado, the cost is estimated at \$16 million annually. Potential damages include severe structural damage; cracked driveways, sidewalks, and basement floors; heaving of roads and highway structures; condemnation of buildings; and disruption of pipelines and other utilities. Destructive forces may be upward, horizontal, or both. Buildings designed with lightly loaded foundations and floor systems often incur the greatest damage and costly repairs from expansive soils. Building in and on swelling soils can be done successfully, although more expensively, as long as appropriate construction design and mitigation measures are followed. In some cases, avoidance may be the best mitigation policy.

Geographic Extent

The extent of swelling soils across Jefferson County is primarily contained in the developed portion of the County at the base of the foothills in the northeast portion of the planning area. In fact, the swelling soils neatly follow the rise of the Rocky Mountains along the western and southern portions of the County. The extent of dipping bedrock in the planning area neatly abuts the extent of the mostly horizontal plains of swelling soil on the east, and the fall of the hogback formations on the west. The figures below demonstrate the mapped geologic hazard layers utilized by the planning area for development.

Figure 4-20 Jefferson County Expansive Soils



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado Geological Survey

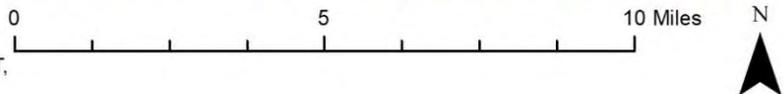
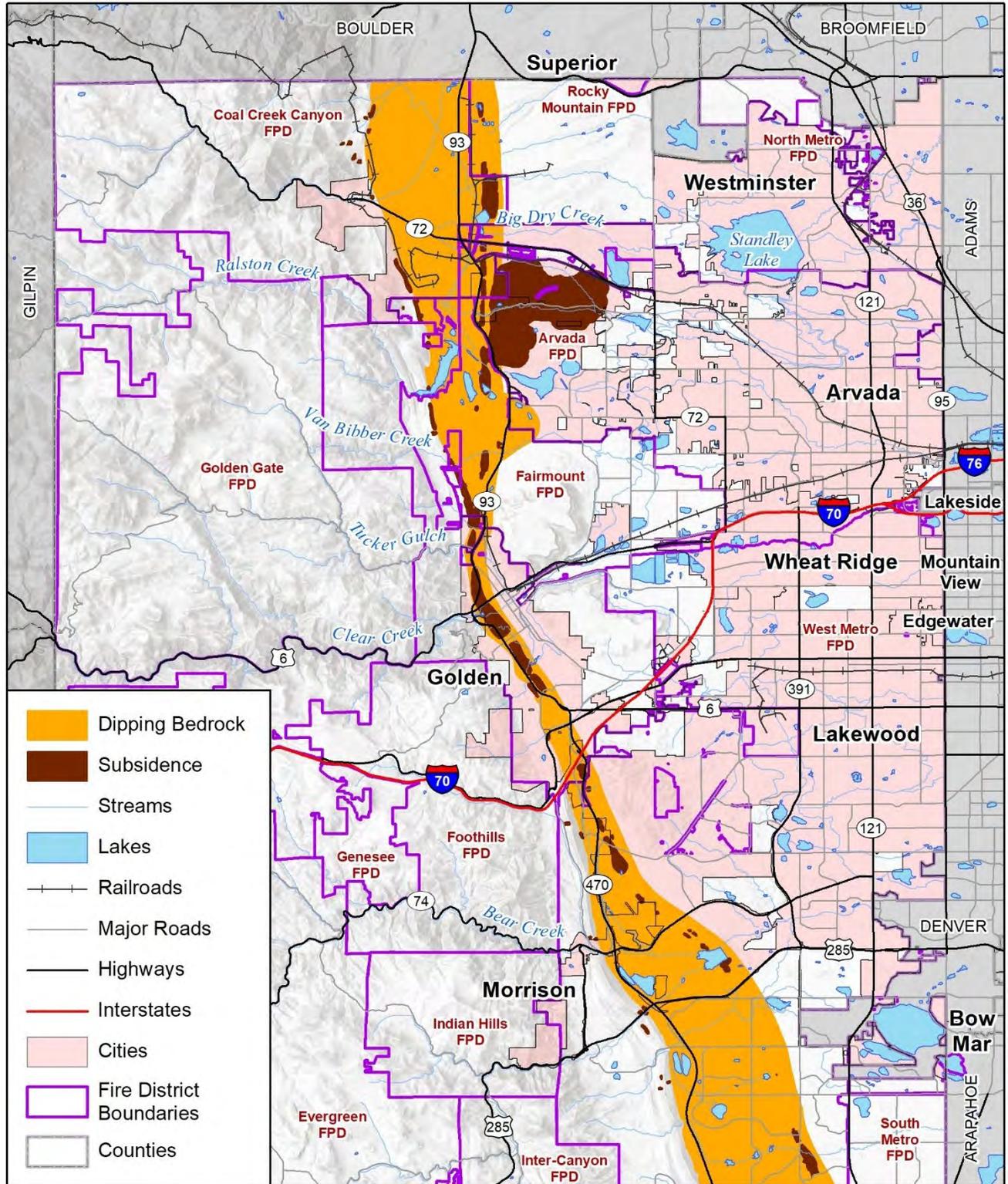
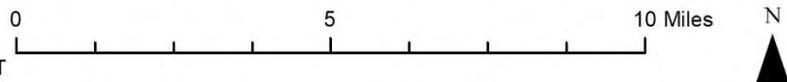


Figure 4-21 Jefferson County Dipping Bedrock and Subsidence



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT



Previous Occurrences

Damage of varying degrees of severity occurs on an ongoing and seasonal basis. The frequency of damage from expansive soils is associated with the cycles of drought and heavy rainfall and also reflects changes in moisture content based on typical seasonal patterns. Building codes and structure ages also contribute to overall damages, as newer structures are usually built with more resistant techniques or as development restrictions in vulnerable areas minimize expansion and exposure. Published data summarizing damages specific to Jefferson County is not available, but it is acknowledged that a certain degree of damage to property and infrastructure occurs annually, as noted above.

Since the last plan update, the most significant areas that intersect Golden and Morrison remain largely undeveloped; however, growth in western Arvada, western Lakewood, and unincorporated areas along Highway 93 and CO-470 since the last update exposes new development to this hazard. It is important to note that recent development east of Highway 93 in West Arvada and north of Golden was not reflected in the 2015 plan. It is reflected in this plan and shows increased exposure for these areas.

The mapped extent of the hazards clearly impacts approximately 50% of the planning area. However, when considering the geographic impact on the planning area, it is important to note that the entire southern portion of the County is occupied by Pike National Forest, and therefore has a minimal impact on this hazard mitigation plan as development in the area is highly regulated outside of County authority. Of the actively developed and monitored lands in the County, more than 75% is subject to swelling soils or dipping bedrock hazards.

Based on this information, the geographic extent rating for swelling soils is **extensive**.

Probability of Future Occurrences

The planning area has extensive development regulations to minimize the damages incurred by dipping bedrock and other geologic hazards in the County. As such, while previous occurrences are certainly commonly known, it is reasonable to assume that damages and future occurrences should be decreasing.

Since records of specific occurrences are not available to the planning process, it is difficult to estimate the probability of future occurrences. The hazards occur seasonally and annually, which should theoretically equate to a highly likely rating. However, mitigation efforts in place in the County since 1995 should prevent the likelihood of the hazard having damaging impacts. Due to the extensiveness of swelling soils in the County the probability rating for this hazard is considered as **likely**.

Magnitude and Severity

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. For this hazard, there is no specific event of record, and the extensive mitigation efforts taken since the initial identification of the hazard nearly thirty years ago are taken into account with the magnitude and severity ratings. Therefore, this hazard will be evaluated for potential worst-case scenarios possible under current regulatory standards. Such an event could potentially damage entire neighborhoods, including roads, sidewalks, properties, and utility pipes. Even minor damages on such a scale would quickly incur enormous costs. While critical infrastructure services are not directly vulnerable to the hazard, structures experience the same risks identified for private and commercial properties: if they are built on swelling soil without adequate or appropriate building mitigation, they are vulnerable to damage. In worst case scenarios, this could include loss of communication lines or severe damages to structures rendering them uninhabitable. If this occurred to a hospital or jail, for instance, it could have significant social repercussions, in addition to the incurred costs. Injuries, illnesses and deaths associated with the hazard would be unique and minimal, and probably incurred as secondary hazards resulting from damages to infrastructure. Overall, though the fiscal damage may be extensive, the overall severity and impacts of the hazard are readily mitigated, reducing the overall impacts.

Based on these factors, the magnitude and severity rating for swelling soils is considered **limited**.

Climate Change Considerations

Changing climate conditions are expected to affect soil resources in many ways. During hot, dry years annual grasses that stabilize and protect topsoil often fail to germinate or do not grow well. This leaves soil surfaces highly vulnerable to erosion from wind and precipitation runoff. Without the availability of nutrient- rich topsoil, crops struggle to survive and flourish. As discussed previously, higher rates of erosion can have a profound effect on agricultural production and on the economies of rural areas of the county.

Many soils and rocks have the potential to swell or expand based on a combination of its mineralogy and water content. The actual swelling of expansive soils will be caused by a change in the environment (e.g. water content, stress, chemistry, or temperature) in which the material exists. Since the 1950s, snow precipitation and duration of snowpack have both decreased while rising temperatures have increase rate of water evaporating into the air and earlier runoff, creating drier soil conditions in Colorado (EPA 2016). More extremes in climate conditions (e.g. wet-dry conditions), could potentially exacerbate the swelling of expansive soil issues in the future.

Vulnerability Assessment

General Property

Similar to the subsidence hazard, the majority of the hazard's significance is drawn from the exposure of existing development to this hazard. As identified in the hazard profile and noted above, extensive areas of the planning region east of the foothills are characterized to some extent by swelling soils. Older construction may not be resistant to the swelling soil conditions and, therefore, may experience expensive and potentially extensive damages. This includes heaving sidewalks, structural damage to walls and basements, the need to replace windows and doors, or dangers and damages caused by ruptured pipelines. Newer construction may have included mitigation techniques to avoid most damage from the hazard, but the dangers continue if mitigation actions are not supported by homeowners. For example, the maintenance of grading away from foundations and the use of appropriate landscaping near structures must be continued to prevent an overabundance of water in vulnerable soils near structures. While continued public education efforts may help increase compliance for landscaping and interior finishing mitigation actions, physical reconstruction of foundations is probably not feasible in all but the most heavily impacted of existing development. Therefore, damages may be expected into the future for existing structures.

GIS was used to create a risk assessment for geological hazards in Jefferson County. Dipping bedrock (i.e. heaving bedrock) hazard data was overlaid on Jefferson County parcel and assessor's data. For the purposes of the analysis, if the hazard zone intersects an improved parcel center, its improved value is included and parcel is counted in Table 4-33. Results are sorted by occupancy type and by jurisdiction to demonstrate how the hazard's risk varies across the planning area.

This analysis outlines the potential exposure of improvements built on dipping bedrock for existing development in the planning area. This represents only a tiny portion of the swelling-soil related building exposure, as a swelling soils GIS layer was not available. However, the exposure to the dipping bedrock alone identifies that there could be potential for damage from this hazard. The table indicates that Golden, Lakewood, Morrison, Arvada and the unincorporated areas east of the foothills have the greatest exposure to this hazard. In this analysis, improved values (typically structures and buildings) are assumed to be potentially exposed, but not necessarily 'at risk.' This analysis does not take into account site-specific mitigation measures that may be in place, thus estimating losses for dipping bedrock is difficult.

Compared to 2016, in general exposure of buildings to dipping bedrock increased for all jurisdictions, likely due to development outward for all jurisdictions. Residential property exposure to dipping bedrock increased for parcels for Arvada, Golden, Lakewood, and Unincorporated. For example, residential property improved parcels exposed to dipping bedrock increased from 22 to 203, nearly a 10-fold increase.

Table 4-33 Exposure of Buildings to Dipping Bedrock

Jurisdiction	Property Type	Improved Parcels	Building Parcels	Total Value	Population
Arvada	Commercial	2	2	\$3,589,478	
	Industrial	2	2	\$8,225,885	
	Residential	203	205	\$128,134,394	508
	Total	207	209	\$139,949,757	508
Golden	Agriculture	1	1	\$70,874	
	Commercial	78	99	\$231,482,526	
	Exempt	15	31	\$208,931,936	
	Industrial	86	89	\$131,473,603	
	Mixed Use	9	17	\$125,961,762	
	Residential	1,786	2,562	\$1,247,910,033	5,739
	Total	1,975	2,799	\$1,945,830,734	5,739
Lakewood	Commercial	2	15	\$8,684,812	
	Exempt	2	3	\$106,386	
	Industrial	1	4	\$176,850	
	Residential	1,391	1,391	\$975,570,386	3,158
	Total	1,396	1,413	\$984,538,434	3,158
Morrison	Commercial	1	1	\$1,681,678	
	Exempt	3	3	\$17,958,698	
	Industrial	1	1	\$181,443	
	Total	5	5	\$19,821,819	0
Unincorporated	Agriculture	9	9	\$1,131,166	
	Commercial	203	242	\$584,914,140	
	Exempt	45	48	\$358,498,400	
	Industrial	183	190	\$286,860,023	
	Mixed Use	65	74	\$118,221,706	
	Residential	20,393	20,696	\$9,911,186,736	52,775
	Total	20,898	21,259	\$11,260,812,171	52,775
Grand Total	24,481	25,685	\$14,350,952,913	62,180	

Source: Jefferson County GIS and Assessor's Data

People

There are no reported injuries or deaths to these soil hazards in Jefferson County, and direct impacts on people are likely to be very minimal.

Critical Facilities and Infrastructure

Existing critical facilities impacted by dipping bedrock and other swelling soil hazards are of particular concern, as the damages caused to these structures may impact the ability of the planning area to provide critical services to the population. Schools built on the area may pose a danger to occupants if the buildings are severely damaged in an event. If building integrity is compromised, it may also reduce the sheltering capacity or public health distribution capacity of the County, as schools are often used for these functions.

Table 4-34 includes the results of a GIS overlay of critical facilities on the dipping bedrock areas. Critical facilities exposed to dipping bedrock increased in number for all jurisdictions compared to the 2016 plan. The unincorporated jurisdiction has the most critical facilities at risk and a majority of those are communication and transportation FEMA lifelines. A number of schools and fire stations in the planning area are potentially exposed. This analysis does not take into account site-specific mitigation measures that may be in place.

Table 4-34 Critical Facilities in Dipping Bedrock Zones in Jefferson County

Jurisdiction	FEMA Lifeline	Critical Facility Type	Count
Arvada	Communications	Land Mobile Private Towers	1
	Communications	Microwave Service Towers	2
	Energy	Electric Substation	2
	Energy	Power Plant	2
	Hazardous Material	Tier II	1
	Transportation	Bridge	2
		Total	10
Golden	Communications	Land Mobile Private Towers	9
	Communications	Microwave Service Towers	9
	Food, Water, Shelter	Water Facility	1
	Hazardous Material	Household Hazardous Waste	1
	Hazardous Material	Tier II	1
	Health and Medical	Nursing Home	2
	Safety and Security	EOC	1
	Safety and Security	Government Facility	6
	Safety and Security	Law Enforcement	1
	Safety and Security	School	2
	Transportation	Bridge	6
		Total	39
Lakewood	Communications	Land Mobile Private Towers	1
	Energy	Electric Substation	2
	Food, Water, Shelter	Wastewater Plant	1
	Transportation	Bridge	7
		Total	11
Morrison	Communications	Land Mobile Private Towers	1
	Safety and Security	Fire Station	1
	Transportation	Bridge	2
		Total	4
Unincorporated	Communications	Land Mobile Private Towers	31
	Communications	Microwave Service Towers	29
	Energy	Electric Substation	6
	Energy	Power Plant	1
	Hazardous Material	Tier II	13
	Health and Medical	Nursing Home	9
	Safety and Security	Fire Station	2

Jurisdiction	FEMA Lifeline	Critical Facility Type	Count
	Safety and Security	Government Facility	1
	Safety and Security	Law Enforcement	1
	Safety and Security	School	17
	Transportation	Bridge	45
	Transportation	Government Facility	4
Total			159

Source: HIFLD and CERC

Economy

The economic cost of this hazard is typically minor in the short term, although over time they can add up to significant impacts.

Historical, Cultural, and Natural Resources

Collapsible and expansive soils are a natural environmental process. Nonetheless they have the potential to alter the landscape and can cause damages to historic and cultural resources.

Future Development

The most effective mitigation actions for expansive soil are complete avoidance or non-conflicting use, or correct engineering design (which includes foundation design, adequate drainage, landscaping, and appropriate interior finishing.) While some areas are devoted to non-conflicting use permits, in particular the areas which are included in the dipping bedrock zones, so much of the Colorado basin is covered in swelling soils that complete avoidance is not possible.

Land use planning regulations in place should temper the risk of swelling soil impacts on future development. Continued efforts to regulate building in areas of high or moderate swelling potential increase the number of structures and infrastructure built with swelling-adaptive methods, which in turn reduces the amount of damage incurred each year on the property. Continued education on the hazard, particularly with landscaping and maintenance concerns, will be needed to reduce the impacts of the hazard on development. As existing development deteriorates and requires either renovation or reconstruction, mitigation methods should be implemented to bring the developments up to contemporary mitigation standards.

Since the last plan update, the most significant areas that intersect Golden and Morrison remain largely undeveloped; however, growth in western Arvada, unincorporated areas along Highway 93, and in Lakewood exposes new development to this hazard. It is important to note that recent development east of Highway 93 in West Arvada and north of Golden was not reflected in the 2015 parcel and associated databases. It is reflected in this plan and shows increased exposure for these areas.

Overall Hazard Significance

Swelling soil in Jefferson County has, historically, exerted significant impacts on the County, particularly during the large growth expansion experienced between 1970 and 1995. In response to the growing hazard, Jefferson County formed and convened an Expansive Soils Task Force in the spring of 1994 and implemented development regulations by 1995. As a result, the impacts of the hazards in the planning area have been extensively mitigated, either by restricting where development is permitted or by heavily regulating the type of construction permitted in certain areas to adequately address the hazard. The geographic extent of the hazard is considered **extensive**. The probability of future occurrences is considered **likely** and the magnitude/severity for the event of record is **limited**. In addition, the HMPC considers the hazard to have a low overall impact on the jurisdiction. This equates to an overall impact rating of **medium**. In many ways, the swelling soils hazard is an excellent example for demonstrating the effectiveness of how mitigation efforts may reduce the vulnerabilities and risks of a previously high-concern hazard. Sound planning and engineering practices should keep the impact to future development low, however the potential for damages exist in older residential areas.

4.3.8 Extreme Temperatures

Description

Extreme Heat

The Colorado State Hazard Mitigation Plan defines extreme heat as “temperatures over 90 degrees for an extended period of time, or that hover 10 degrees or more above the average high temperature for the region and last for multiple consecutive days.” In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornadoes, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Heat disorders generally have to do with a reduction or collapse of the body’s ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body’s inner core begins to rise, and heat-related illness may develop. Elderly persons, small children, those with chronic illnesses, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails.

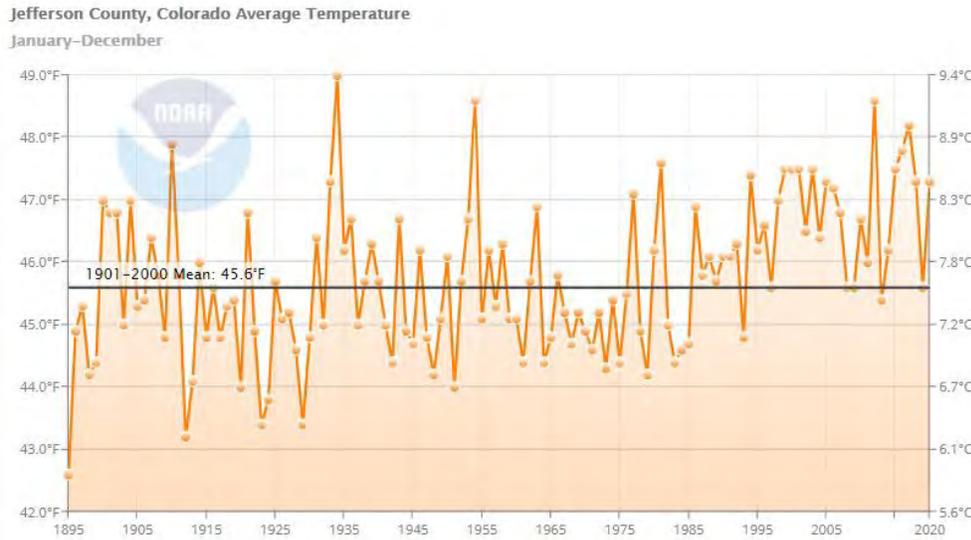
Extreme Cold

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities.

Previous Occurrences

According to the National Weather Service Forecast Office for Denver/Boulder, there have been 82 streaks with temperatures of 90 degrees or greater since 1895, which accounts for more than 150 days of extremely hot temperatures in the metro area (NWS). During 2008, Denver’s 87-year-old record for the number of consecutive days above 90 degrees Fahrenheit was broken. The new record of 24 consecutive days surpassed the previous record by almost a week. On August 1st, it reached 104 degrees, breaking a record set in 1938 and on August 2nd, it reached 103 degrees, breaking a record set in 1878. In addition, as of August 2008, the area documented 68 days with temperatures above 100°F and 29 days with temperatures below -20°F between February 2008 and 1872 (NWS), as shown in Figure 4-22.

Figure 4-22 Jefferson County Average Annual Temperature, 1895 – 2020



Source: NOAA

By contrast, the Denver Metro area averages 156 days a year with a minimum temperature of 32°F or less. The highest recorded temperature for Jefferson County is 104°F, and the lowest is -41°F. The Southwest Climate and Environmental Information Collaborative (SCENIC) reports data summaries from a station in the City of Lakewood and a station in the Town of Evergreen. Table 4-35 contains temperature summaries related to extreme heat for the station.

Table 4-35 Temperature Data from Lakewood and Evergreen Stations

Station	Average Annual Maximum Temperature	Average Annual Minimum Temperature	Extreme Maximum Temperature	Extreme Minimum Temperature	Avg Annual Days Max. >90	Avg Annual Days Max. <32	Avg Annual Days Min. <32	Avg Annual Days Min. <0
Lakewood ¹ (054762)	64	37	104 6/27/1994	-26 1/12/1963	8.7	6.5	49.2	2
Evergreen ² (052790)	61	27	97 6/236/2012	-38 1/12/1963	1.5	6.7	74.3	6

Source: SCENIC ¹Period of Record: 1962-2020 ²Period of Record: 1961-2020

Since temperature variations are a regional hazard, many of the previous occurrences are documented at a regional level as well. For example, between 1996 and 2020 the NCEI database reflects one incident of extreme temperatures for Jefferson County (extreme cold/wind chill in 2011), but documents eight incidents in neighboring Denver County. Therefore, the incidents below impact more than just the planning region.

1983 – A cold spell impacted the entire Metro area with readings dipping to -21°F, marking the coldest recorded temperature in 20 years.

1989 – Periods of extreme cold and high winds combined with snow created a severe storm scenario. Stapleton Airport was closed, and a 46-car pileup occurred on Interstate 25. More details on this storm are captured in Section 4.3.13.

April 11, 1995 – Extreme cold was reported across the region with temperatures recorded at 13°F. Damages to wheat crops in Arapahoe County were estimated at \$1 million (\$1.4 million in 2008 dollars).

December 16-18, 1996 – Extreme wind chills impacted the entire Front Range and plains regions. Lows in the Denver area were reported at -9°F. A homeless man found in his car, with a body temperature of only 85°F at the time, died a few hours later.

October 24-25, 1997 – A blizzard left snow up to 4' deep in the foothills and wind gusts were documented at 70 mph. With wind chill, temperatures dropped to between -25°F and -40°F. A State of Emergency was declared, with five recorded deaths and 15 injuries.

December 18-24, 1998 – An arctic air mass settled in over northeastern Colorado dropping overnight temperatures well below zero for 6 consecutive days. Overnight temperatures bottomed out at -19°F on the morning of the 22nd. At least 15 people, mostly homeless, were treated for hypothermia at area hospitals. The bitter cold weather was responsible, either directly or indirectly, for at least 5 fatalities. Three of the victims died directly from exposure. The cold weather also caused intermittent power outages. Following the cold snap, thawing water pipes cracked and burst in several homes and businesses causing extensive damage. Damage estimates were unavailable.

June and July 2000 – June 29th marked the beginning of a near record hot streak for the Denver area. The maximum high temperature at Denver International Airport equaled or exceeded the 90°F mark for 17 consecutive days, from June 29th-July 15th; one day short of tying the all-time record. The record of 18 consecutive days was set in two different years, July 1st-18th, 1874 and July 6th-23rd, 1901.

February 1-4, 2011 – A frigid Arctic air mass settled into the Front Range Urban Corridor to start out the month. At Denver International Airport, overnight low temperatures on the 1st through the 3rd were 13 and 17 below zero and zero respectively. The icy temperatures caused pipes to crack and burst following the freeze. At the Jefferson County Courts administration building, a steady stream of water from a crack on the 5th floor went unnoticed and flooded all floors of the administration wing overnight, damaging much of the office equipment, furniture and carpet. The icy temperatures also forced the closure of several school districts.

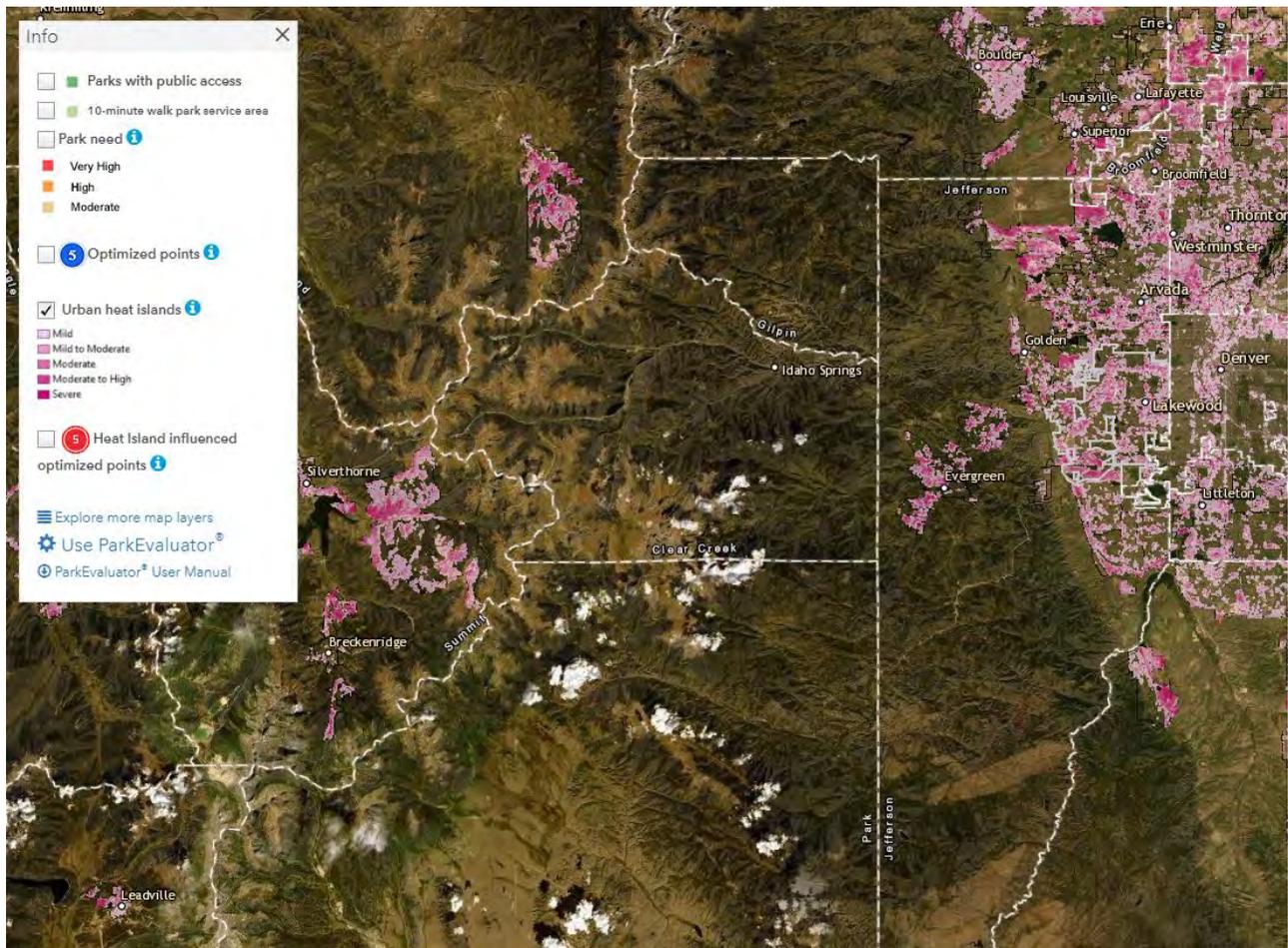
Geographic Extent

The inherent nature of temperature hazards makes them a regional threat, impacting most or all of the planning area simultaneously although the impacts will vary by location. The County being located along the foothills of the Rocky Mountains and encompasses the West Denver Metro area municipalities of Arvada, Golden, Lakewood, Lakeside, Morrison, Mountain View, Westminster and Wheat Ridge. These areas experience similar temperate climate to the remaining Denver Metropolitan Area and are more susceptible to extreme heat events compared to the higher elevations of the County due to the more urbanized areas. The areas of higher elevations like Kittredge, Evergreen, Idledale, and the unincorporated rural mountain areas are more susceptible to extreme variations in general, which can pose a danger to those citizens that may be more vulnerable and certainly so if those extremes temperatures are extended. This is reflected in the previous occurrence record, which consistently discusses the Denver Metro Area, rather than singling out particular counties or communities.

Urbanized areas, in the Denver Metro Area can experience pockets of heightened temperatures where surfaces such as pavement and roofs become hotter than the air temperatures, a phenomenon known as the urban heat island effect. These hot surfaces also retain heat, causing high temperatures to persist even when air temperature drops. Per the EPA, "the annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings. On a clear, calm night, however, the temperature difference can be as much as 22°F" (US EPA). Colorado's climate tends to experience large day and night temperature changes. This nighttime cooling will help alleviate heat conditions and is thought to benefit and reduce risk of extreme heat.

The Trust for Public Land, ParkServe online mapping tool allows users to find areas that are impacted by urban heat islands as well as the availability of parks with public access. Figure 4-23 shows the urban heat island areas within Jefferson County and the level of severity, from mild to severe impact.

Figure 4-23 Urban Heat Island Areas within Jefferson County



Source: The Trust for Public Lands, ParkServe <https://parkservetpl.org/mapping/> The geographic extent rating for extreme temperatures is extensive.

Probability of Future Occurrences

Temperature extremes occur on a regular basis, with an annual average of 4.6 days in the mountain areas and 25.7 in the metro area where the maximum temperatures exceed 90°F. The temperatures dip below freezing (32°F) an annual average of 19 days. Severe incidents or prolonged exposures to a temperature extreme are a higher threat to the community than isolated, seasonal occurrences.

There have been 23 incidents of extreme temperatures in Jefferson County since 1961. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a severe temperature extreme occurring in any given year is 39%. This corresponds to a probability of future occurrences rating of **likely**.

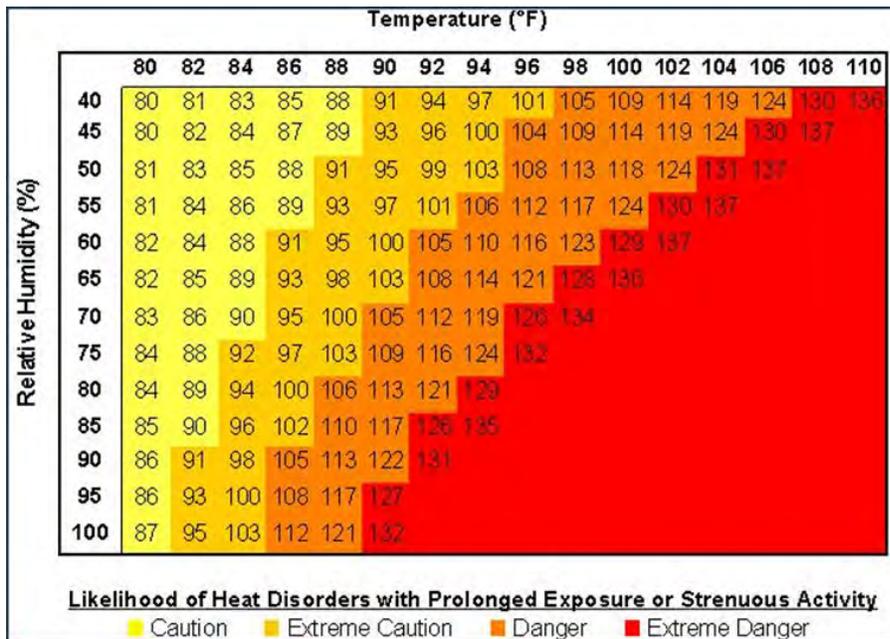
Magnitude and Severity

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. Since temperature extremes refer to both extreme heat and extreme cold, there is not a single event of record. The event of record for extreme heat in Jefferson County occurred in the summer of 2000. While specific property damages are not available, the event coincided with a severe drought period, which caused extensive damages to crops and personal property, impacted overall water supplies, and caused economic damages due to both conditions. The event of record for

extended periods of severe cold in Jefferson County occurred during December 18-24 in 1998. Damages caused by ruptured water pipes were considered extensive in both the private and public sectors. Power outages increased damages to property and impacted human lives. Hospitals documented a small surge in casualties either directly or indirectly attributed to the cold, and at least 15 injuries were reported. Five deaths were attributed to the cold weather as well, with three of them due directly to exposure. Nationwide, extreme temperatures remain the leading cause of weather-related deaths.

The National Weather Service Heat Index Program provides a measure of the extent of typical health impacts of exposure to heat, as shown in Figure 4-24 and Table 4-36. During these conditions, the human body has difficulties cooling through the normal method of the evaporation of perspiration, and health risks rise. The chart below illustrates the relationship of temperature and humidity to heat disorders.

Figure 4-24 Heat Index Chart



Source: National Weather Service

Note that Heat Index (HI) values were devised for shady, light wind conditions. Exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

Table 4-36 Typical Health Impacts of Extreme Heat by Heat Index

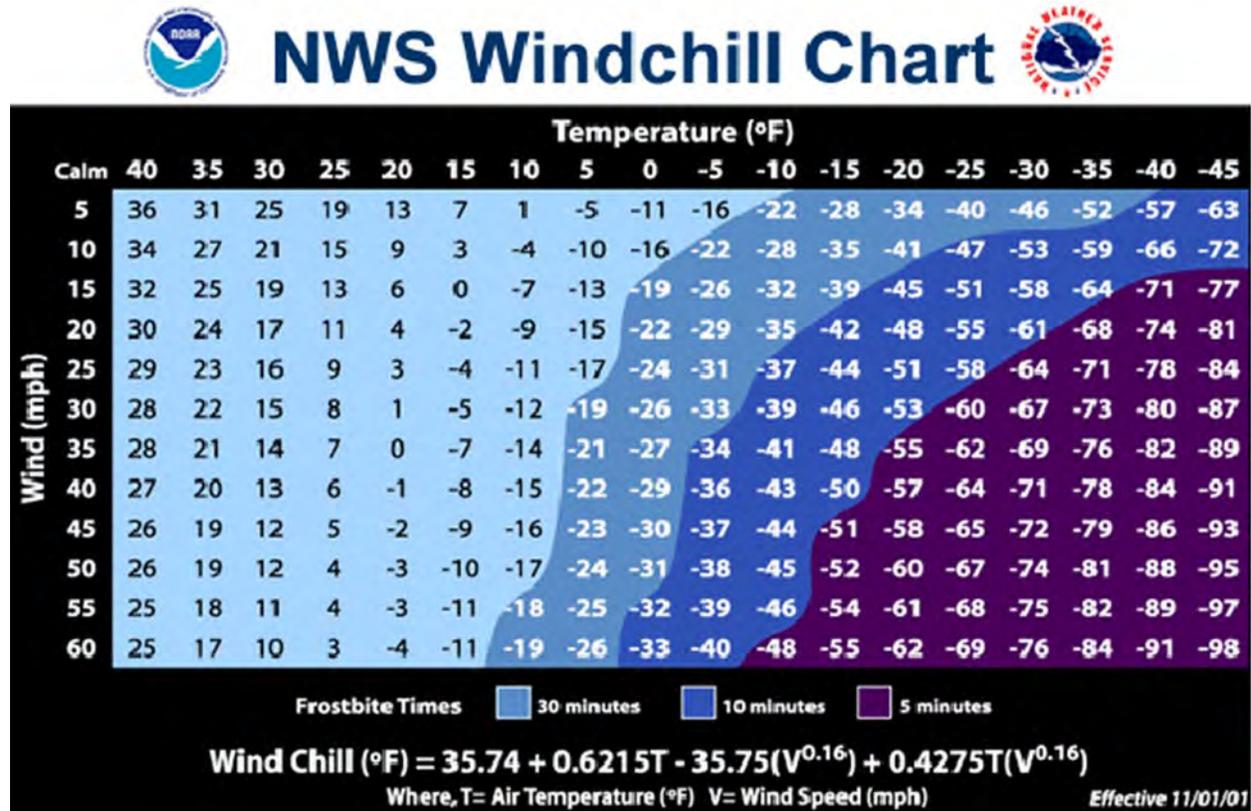
Heat Index	Disorder
80-90° F	Fatigue possible with prolonged exposure and/or physical activity
90-105° F	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

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

In 2001, the NWS implemented an updated Wind Chill Temperature index (see Figure 4-25). This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 4-25 National Weather Service Wind Chill Chart



Source: National Weather Service

The National Weather Service Denver/Boulder Forecast Office issues warnings and advisories for cold temperatures. The following is a breakdown on the various NWS defined watches, warnings and advisories that could be issued:

- Wind Chill Watch is issued when wind chill warning criteria are possible in the next 12 to 35 hours.
- Wind Chill Warning is issued for wind chills of at least -25°F on the plains and -35°F in the mountains and foothills.
- Wind Chill advisory is issues on the plains when wind and temperature combine to produce wind chill values of -18°F to -25°F and -25°F for the mountains and foothills.
- Freeze Watch is issued when freeze conditions are possible in the next 12 to 36 hours.
- Freeze Warning is issued during the growing season when widespread temperatures are expected to drop to below 32°F.
- A frost advisory is issued during the growing season when temperatures are expected to drop to between 32°F and 35°F on clear calm nights.

The Jefferson County Emergency Preparedness Guide addresses both of these temperature extremes, and notes that people living in urban areas may experience a greater risk from the effects of a prolonged heat wave than those living in rural areas, due to the impacts of heat on the atmosphere, air quality and temperature. In some cases, extreme heat incidents may lead to emergency water shortages, which are shorter in duration than a drought, but exhibit similar impacts and secondary hazardous situations.

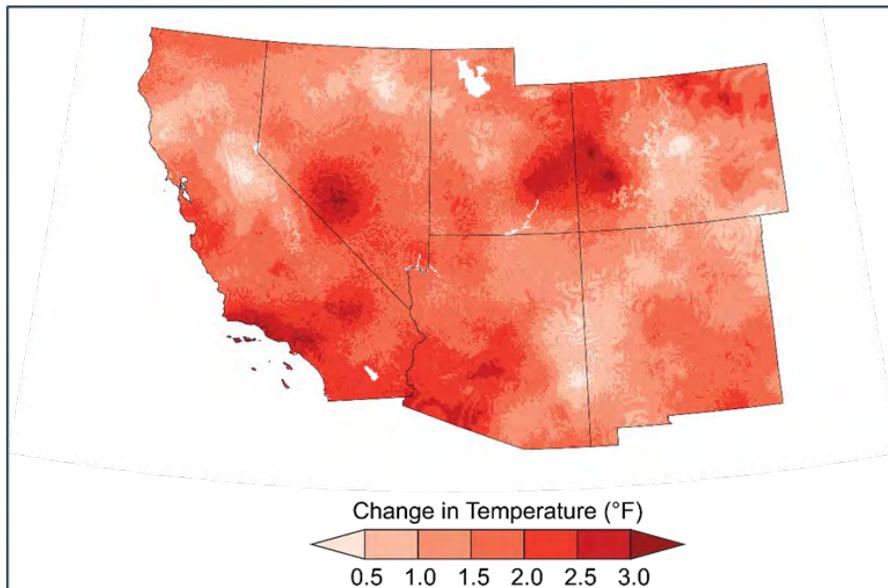
Based on these factors, the magnitude and severity rating for temperature extremes is considered **limited**.

Climate Change Considerations

Climate change is projected to increase the uncertainty of weather patterns and produce more extreme climate induced events. Scientists have suggested that warming in the Arctic has been linked changes in the jet stream which may lead to increased polar vortex events in Colorado. The polar vortex is well documented and is described as large areas of low pressure and cold air surrounding the North and South poles. Increased temperatures in the polar regions has weakened and destabilized the jet stream leading to polar air to dip into lower latitudes, bringing it farther south than typical (UC Davis).

Research cited in the Fourth National Climate Assessment indicates that average temperatures have already increased across the Southwest and will likely continue to rise. Figure 4-26 shows the difference between the 1986-2016 average temperature and the 1901-1960 average temperature. This trend toward higher temperatures is expected to continue and would cause more frequent and severe droughts in the Southwest as well as drier future conditions and an increased risk of megadroughts—dry periods lasting 10 years or more). Additionally, current models project decreases in snowpack, less snow and more rain, shorter snowfall seasons, and earlier runoff, all of which may increase the probability of future water shortages (Gonzalez et al., 2018).

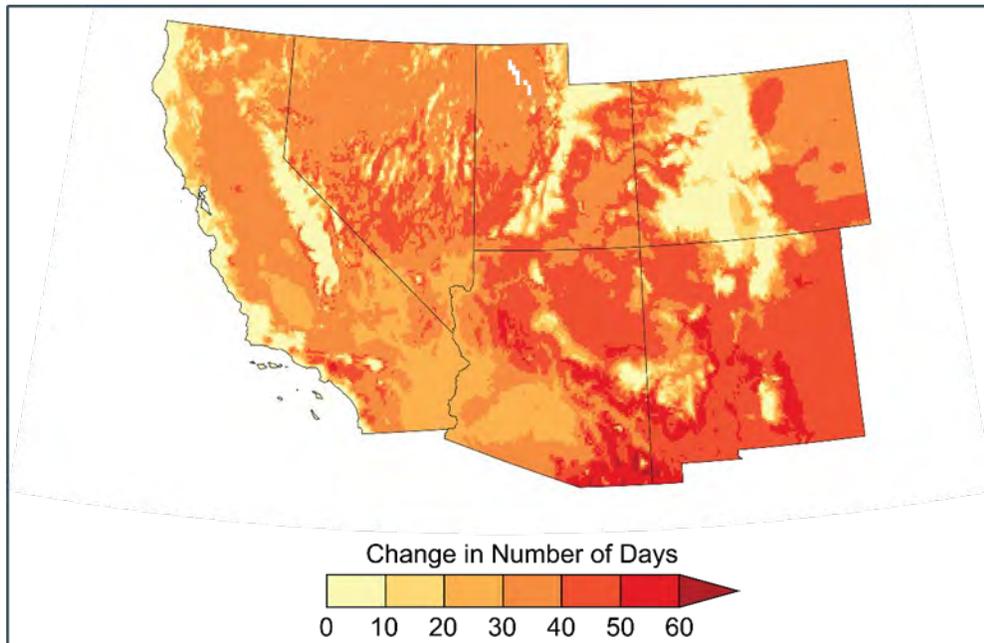
Figure 4-26 Change in Average Temperature Across the Southwest, 1901-1960 to 1986-2016



Source: Fourth National Climate Assessment

Extreme heat is also expected to increase in frequency. Figure 4-27 shows projected increases in extreme heat as an increase in the number of days per year when the temperature exceeds 90°F by the period 2036-2065 compared to the period 1976-2005. Under the higher emissions scenario (RCP8.5), the number of days of extreme heat would increase in Jefferson County by 30 to 50 days based on the figure below.

Figure 4-27 Projected Increases in Extreme Heat



Source: Fourth National Climate Assessment *Based on higher emission scenario RCP8.5

Vulnerability Assessment

General Property

Recent research indicates that the impact of extreme temperatures, particularly on populations, has been historically under-represented. The risks of extreme temperatures are often profiled as part of larger hazards, such as severe winter storms or drought. However, as temperature variances may occur outside of larger hazards or outside of the expected seasons but still incur large costs, it is important to examine them as stand-alone hazards. Extreme heat may overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure and presents health concerns to individuals outside in the temperatures. Extreme heat may also be a secondary effect of droughts or may cause temporary drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist.

Extreme cold impacts structures when pipes or water mains freeze and burst, causing damage. Cold can also, in the most extreme of circumstances, make materials more fragile and breakable, although the Front Range rarely gets this cold. Extreme cold may also lead to higher electricity and natural gas demands to maintain appropriate indoor heating levels combined with damages caused to the delivery infrastructure such as frozen lines and pipes. Cold may impact transportation as well. Exposed populations may be at risk while waiting for public transportation, particularly when combined with wind-chill, and some vehicles may not start which impacts the commute of the workforce and, in worst case scenarios, the movement of emergency services personnel.

People

The impacts of cold and extreme heat on health are also a consideration. Traditionally, the very young and very old are considered at higher risk to the effects of extreme temperatures, but any populations outdoors in the weather are exposed, including otherwise young and healthy adults and homeless populations. Arguably, the young-and-otherwise-healthy demographic may be more exposed and experience a higher vulnerability because of the increased likelihood that they will be out in the extreme temperature deviation, whether due to commuting for work or school, conducting property maintenance such as snow removal or lawn care, or for recreational reasons.

Critical Facilities and Infrastructure

Prolonged heat exposure can have significant impacts on infrastructure. Prolonged high heat exposure increases the potential of pavement deterioration, as well as railroad warping or buckling. High heat also puts a strain on energy systems and consumption, as air conditioners are run at a higher rate and for longer. Extreme heat can also reduce transmission capacity over electric systems.

Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

The impact of severe temperature deviation on power delivery is a significant factor when assessing current development exposure. Xcel Energy, the utility provider for Jefferson County, estimates that service outages due to extreme temperatures cost the utility an average of \$50,000 to fix for every 20,000 people affected. This includes repair and replacements costs, equipment usage and crew overtime.

Economy

Extreme temperatures can lead to potential loss of facilities or infrastructure function or accessibility and uninsured damages. Impact to transportation sector and movement of goods. Historic events in Colorado have impacted community business districts where a majority of businesses are lost (CO SHMP 2018).

Historical, Cultural, and Natural Resources

Jefferson County has hundreds of square miles of parks and open space which provide habitat for various species that are valuable to residents and visitors to the County, and which are vulnerable to extreme temperatures. (Jefferson County 2018). Extreme temperatures can have significant impacts to these natural ecosystems. Increasing temperatures may cause species to shift habitats in elevation and latitude and extended periods of extreme heat can stress both flora and fauna species. According to Colorado Parks and Wildlife, warmer temperatures can also lead to earlier snowmelt affecting insect and wildlife life cycles as well as seed production and germination.

Future Development

Since structures are not usually directly impacted by severe temperature fluctuations, continued development is less impacted by this hazard than others in the plan. However, new development can add stress to the electric grid, potentially increasing the possibility of brownouts or blackouts.

Pre-emptive cautions such as construction of green buildings that require less energy to heat and cool, use of good insulation on pipes and electric wirings, and smart construction of walkways, parking structures, and pedestrian zones that minimize exposures to severe temperatures may help increase the overall durability of the buildings and the community to the variations. Continued development also implies continued population growth, which raises the number of individuals potentially exposed to variations. Public education efforts should continue to help the population understand the risks and vulnerabilities of outdoor activities, property maintenance, and regular exposures during periods of extreme heat and cold.

Overall Hazard Significance

Extreme temperatures in Jefferson County have a particular impact on the planning area. The risk to the population is the greatest, with exposure posing a significant threat to life and safety of residents. In addition, potential damages to property as an indirect impact of the temperature, particularly during cold weather, are costly. Temperature extremes often accompany other, more obvious hazards such as droughts and blizzards or other winter storms and may have undocumented impacts in the community as well. The geographic extent of the hazard is considered **extensive**. The probability of future occurrences is considered **likely** and the magnitude/severity for the events of record is **limited**. The HMPC considers the hazard to have an overall impact rating of **low** on the County. Collectively, the data indicates that the overall impact rating for extreme temperatures is **low**.

4.3.9 Flood

Description

A flood is an overflow or accumulation of an expanse of water that submerges land. Flooding may result from the volume of water within a river or lake which escapes its normal boundaries. While the size of a lake or river will vary with seasonal changes in precipitation and snow melt, it is not a significant flood unless such escapes of water endanger lives and property of inhabited areas along the waterway, which is referred to as the floodplain.

River (or stream) flooding is normally due to excessive high flows and the strength of the water-force that pushes it out of the river channel, particularly at bends or meanders. Businesses and homes along such rivers usually sustain significant damages. While flood damage can be virtually eliminated by moving away from rivers and other bodies of water, people continue to inhabit areas that are threatened by the flood hazard. Communities are strengthening their floodplain building regulations, acquiring property along floodplains to turn into open space recreational areas, and designing flood control projects that better protect large populations.

Floods can be among the most frequent and costly natural disaster in terms of human hardship and economic loss. They are caused by a number of different weather events. Floods can cause injuries and deaths and substantial damage to structures, landscapes, and critical infrastructure and services. Certain health hazards are also common to flood events. Standing water and wet materials in structures can become a breeding ground for microorganisms such as bacteria, mold, and viruses. This can cause disease, trigger allergic reactions, and damage materials long after the flooding event is over.

Direct impacts such as drowning can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be critical to reduce life and safety impacts.

Although heavy rainfall, especially in the form of cloudbursts, is alone capable of causing flash flooding, snowmelt combined with heavy rainfall can certainly increase the chance of flash flooding. Floods caused by rainstorms can peak within a few hours of the onset, and in less than an hour on smaller streams, leaving little time for evacuation.

Communities in Jefferson County are susceptible to various types of flood events as described below.

Riverine or Overbank Flooding

Riverine or overbank flooding is defined as *a watercourse that 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 occurs when soils are already saturated, or drainage systems overloaded from previous rain events. The duration of riverine floods may vary from a few hours to several days and may exhibit a seasonal pattern over a course of years.

Factors that directly affect the amount of flood runoff include: 1) precipitation amount, precipitation intensity, frequency of precipitation, and its spatial and temporal distribution; 2) the saturation levels of the soils, variation in vegetation, erosion and/or bank stability, and the amount of impervious surfaces due to urbanization; and 3) snow-pack depth at higher elevations, rate of snow melt versus snow evaporation and transpiration, and the ratio or pattern of sunny hot days to cooler cloudy days. The weather pattern during peak runoff can be a major factor in whether a watercourse exceeds its capacity or not. Another critical consideration, though secondary to the flood event, is the presence of debris blocking a waterway, channel, bridge, or culverts. The debris can be recent build-up from current runoff or an accumulation long overdue for removal. In any case, debris can further aggravate a flood event.

Development can alter the natural environment, changing and interrupting natural drainage-ways. As a result, drainage systems can become overloaded more frequently intensifying the effects of flooding.

Figure 4-28 and Figure 4-29 show examples of recent riverine flooding in the County. In Figure 4-28, the Cottonwood trees in Bear Lake Park dramatically show the high water line from the September 2013 flooding. The leaves below the high-water line were destroyed, leaving the tops of the trees untouched and still able to display their fall colors. During the height of the fall floods, the park's water level rose

roughly 55 feet above normal. The park, more than 2,500 acres in size, suffered substantial damage due to the high water level, but functioned as it was designed and protected many people and properties downstream.

Figure 4-28 High Water Mark from September 2013 Flooding in Bear Lake Park



Source: CASFM and Lakewood resident Carole Kaune

Figure 4-29 South Platte River at Trumbull Bridge Hwy 67 June 17, 2015

Source: Jefferson County Emergency Management

The most serious overbank flooding occurs during flash floods. They result from intense rainstorms or following a dam or levee failure. The term flash flood describes localized flooding as an incident of sizable peak flow and magnitude, in conjunction with quick onset and short duration. Flash floods usually result from a heavy rainfall on a relatively small drainage area that can occur very quickly with little or no warning; locally, these are known as cloudburst storms. In contrast, frontal-type rainstorms or snowmelt runoff are more regional in nature, result from moderate rainfall or snowmelt over large areas. Though rain-on-snow flooding can occur, it is fairly infrequent in the Colorado Front Range (and Colorado in general) and does not produce maximum flooding. Flash flooding usually results from a heavy rainfall on a relatively small drainage area occurring very quickly with little or no warning. With residential and business development along these small drainages combined with the quickness of an overbank-type flash flooding, evacuation can be difficult. Early warning systems that include automated detection of heavy rainfall and stream level changes are imperative for the public's safety in these types of developed drainage-ways.

Gulches/Irrigation Ditch/Canal Flooding

Jefferson County has numerous valleys, gulches and creeks, canyons and draws, irrigation ditches, and canals used to convey water collected in the mountain reservoirs to downstream users. Ditches convey irrigation water along hillsides, following contours and, as a result, cut across the natural drainage pattern of stormwater runoff flowing down hillsides. Although efforts are made to separate stormwater runoff and irrigation water, excessive runoff can flow into an irrigation ditch causing overbank flooding or a collapse of the ditch itself. Similar to flash floods, there is often little warning for these types of events.

Urban or Street Flood Events

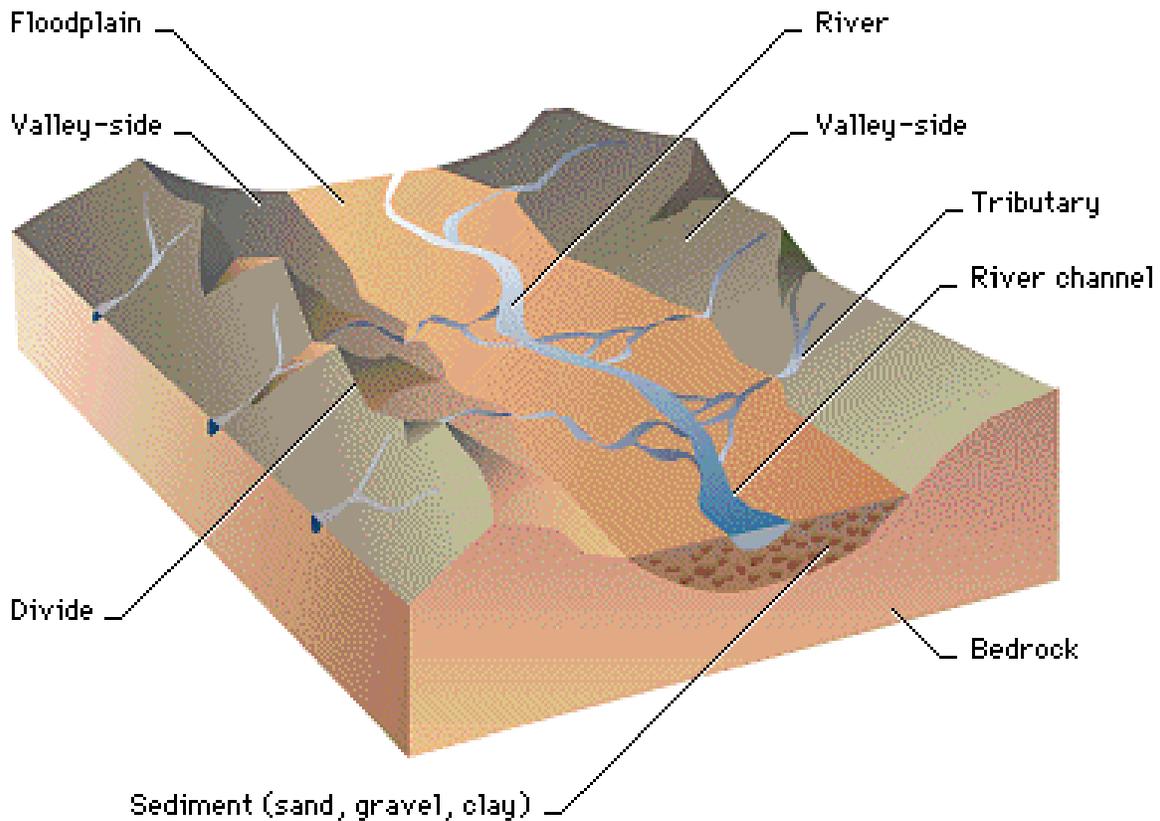
Urban or street flood events occur due to the conversion of land from undeveloped areas to surfaces appropriate for roads, parking lots, and other types of site development needs. This is called urbanization, which is the reason that a soil's ability to absorb water is reduced. When soil is subjected to an excessive

amount of water in an accelerated timeframe, it cannot balance the rate of absorption. Urbanization increases runoff two to six times over what would occur on natural terrain. Underpasses, street flooding and yard ponding usually do not exceed more than a foot or two and are often viewed more as a nuisance than a major hazard. However, in some localized urban areas, larger flood velocities and depths, which can develop as rapidly as flash floods, can produce extremely hazardous conditions to the public and block vehicular traffic. Stormwater drainage systems may or may not be adequate enough to handle the incoming flow. Impervious surface studies can be conducted to assess runoff levels, which can identify areas of increased risk or threat as well as the need for improved capture of stormwater runoff.

Floodplain

As shown in Figure 4-30, a floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current.

Figure 4-30 Floodplain Topography



Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRM). FIRM maps are currently being replaced with Digital Flood Insurance Rate Maps (DFIRM) as part of FEMA's map modernization project. The Jefferson County DFIRM is current as February 5, 2014. It is the official

map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the community. Private citizens and insurance agents use FIRM's to determine whether or not specific properties are located within the FEMA defined flood hazard zones.

Each of the flood zones that begins with the letter 'A' depict the Special Flood Hazard Area, or the 1% annual chance flood event (commonly referred to as the 100-year flood). Table 4-37 explains the difference between mapped flood zones.

Table 4-37 Flood Hazard Zones

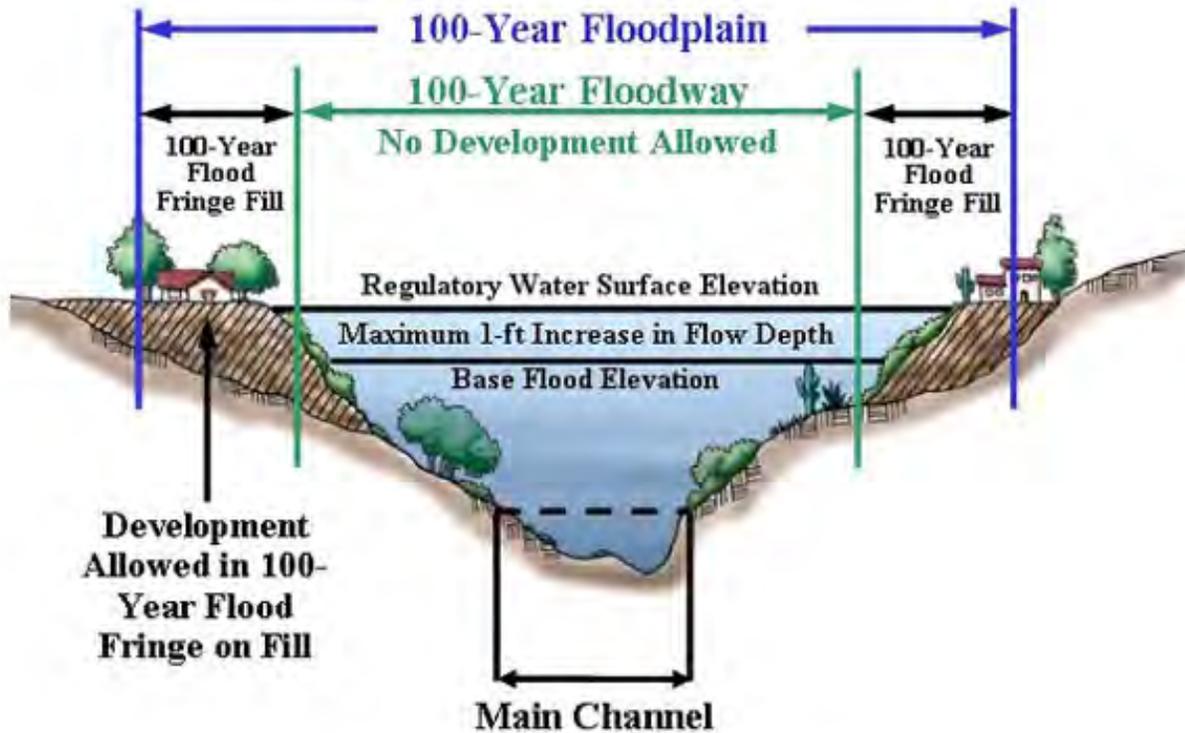
Flood Zone	Description
1% Annual Chance	100-year Flood: Also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year.
Zone A	100-year Flood: No base flood elevations provided
Zone AE	100-year Flood: Base flood elevations provided
Zone AO	100-year Flood: Sheet flow areas, base flood depths provided
0.2% Annual Chance or Shaded Zone X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depth of less than 1 foot or with drainage areas less than 1 square mile; and areas protect by levees from 1% annual chance flood
Zone D	Areas in which flood hazards are undetermined, but possible
Zone X	Areas determined to be outside the 0.2% annual chance floodplain

Source: FEMA

Community officials use DFIRM's to administer floodplain management regulations and to mitigate flood damage. Lending institutions and federal agencies use FIRM's to locate properties and buildings in relation to mapped flood hazards, and to determine whether flood insurance is required when making loans or providing grants following a disaster for the purchase or construction of a building.

The floodplain most often refers to that area that is inundated by the 100-year flood. The term 100-year flood is misleading. It is not the flood that will occur once every 100 years. Rather, it is the flood elevation (or depth) that has a 1- percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the minimum standard used by most Federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. Over a 30-year period (the term of a typical home mortgage), a structure located within a special flood hazard area has a one-in-four chance of experiencing the flood depicted on the NFIP map. The chance is even more likely that a damaging flood of lesser magnitude will occur, while the possibility of a much larger flood is also quite real. Extreme events have been measured at many locations that exceed the magnitude of the 100-year flood by three times or more. Figure 4-31 illustrates a 100-year floodplain. Figure 4-32 shows the 100-year floodplains in Jefferson County. Only major streams are highlighted; however, flooding can occur in any channel or drainage in the County.

Figure 4-31 100-year Floodplain

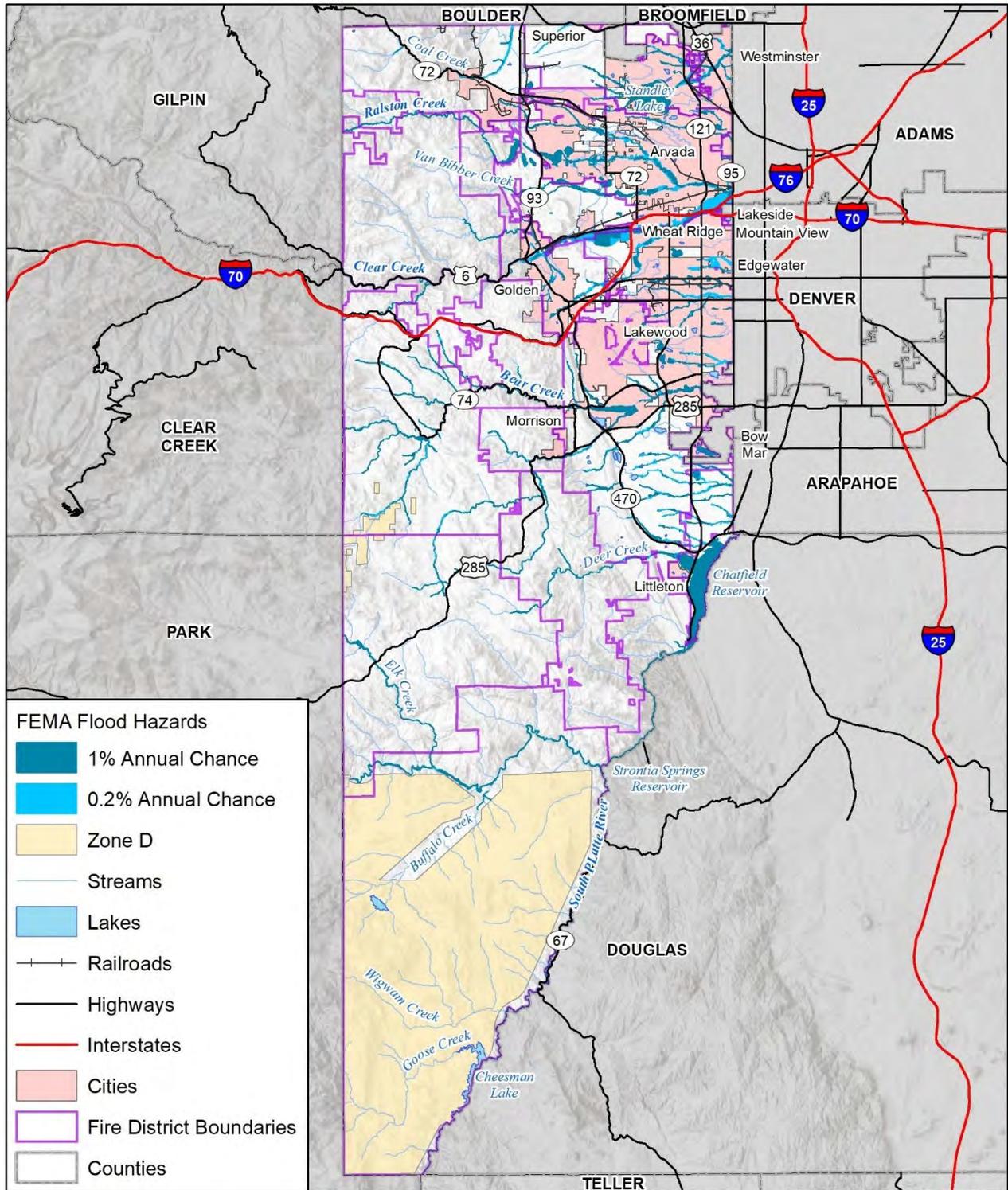


Geographic Extent

Jefferson County has multiple creeks, tributaries, and associated floodplains that comprise the geographic extent of flooding throughout the planning area. It is a region heavily influenced by snow and rain patterns in the mountains that flow downstream to a heavily urbanized area in the foothills and plains. Abbreviated snow melts can cause flooding along these creeks and tributaries and they can swell to many times their size after large amounts of rainfall in a short period of time. This overwhelms the smaller channels quickly, which in turn impacts downstream populated areas with little or no warning. As mentioned above, the Buffalo Creek and Hayman burn areas were stripped of vital vegetation ground cover, which is imperative for natural flood mitigation. With soils scorched and stripped of their nutrients and cohesiveness, the areas became more susceptible to flash flooding immediately after the wildfire devastation. It has continued to be a secondary impact issue ten years after the initial incident. In fact, two deaths occurred in the North Fork fire district (Pine Junction area) from secondary flash flooding within weeks after the fire, which caused massive debris flows where innocent people were caught in their paths. Debris flows of this magnitude are attributed to the inability of depleted soils and lack of ground vegetation to hold back the runoff, and thereby normal rainfall precipitation can become a wall of moving earthen debris. See more description of debris flows in the landslide, debris flow and rockfall hazard profile.

The geographic extent rating for flooding is limited as it is within 10% to 25% of the County’s area. Refer to Figure 4-32 through Figure 4-34 for the location of the FEMA and local floodplains. Figure 4-34 depicts areas Jefferson County regulates that are within Zone D, and are within 50 feet of the thalweg of a major drainage tributary area of 130 acres or greater. The section following these figures details the extent and history of flood hazards by the major watersheds in the County including Bear Creek, Clear Creek, South Platte River, Turkey Creek, and Ralston Creek.

Figure 4-32 Jefferson County Flood Hazard Map



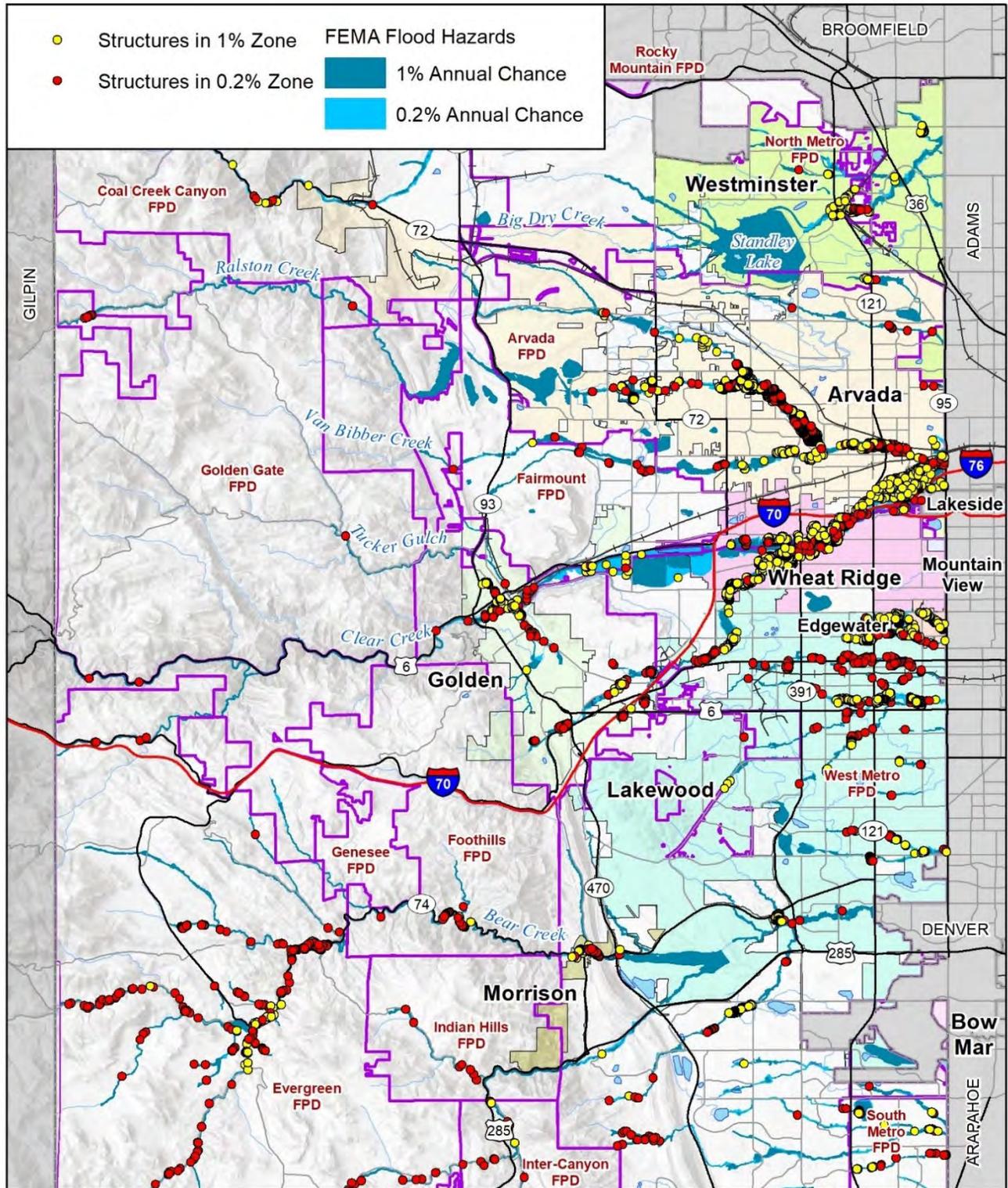
- FEMA Flood Hazards**
- 1% Annual Chance
 - 0.2% Annual Chance
 - Zone D
 - Streams
 - Lakes
 - Railroads
 - Highways
 - Interstates
 - Cities
 - Fire District Boundaries
 - Counties

Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

0 5 10 Miles



Figure 4-33 Jefferson County Flood Hazard Map (North Half)



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

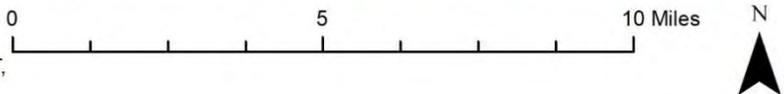
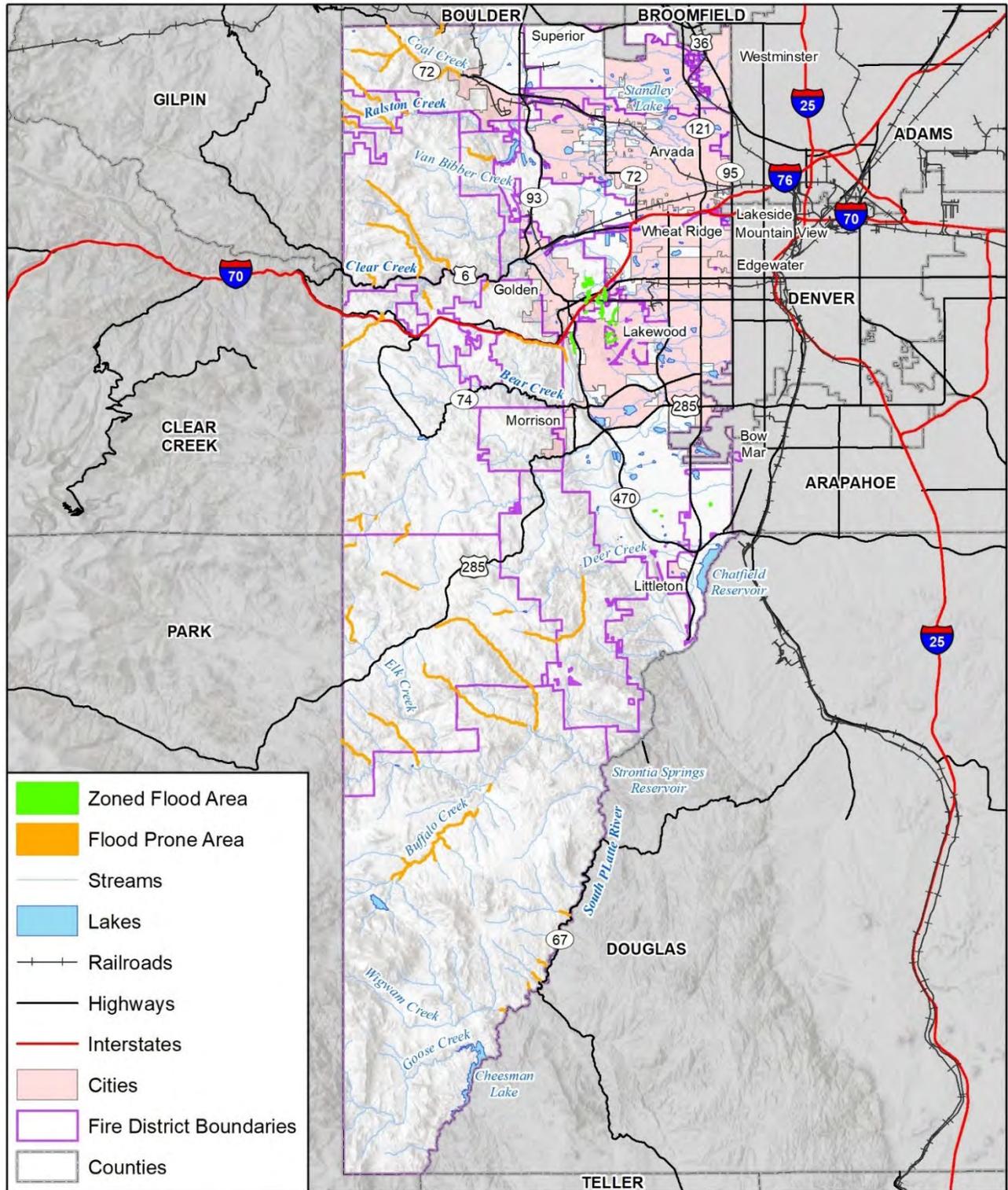


Figure 4-34 Jefferson County Local Flood Hazards



Map compiled 4/2021;
intended for planning purposes only.
wood. Data Source: Jefferson County, CDOT

0 5 10 Miles



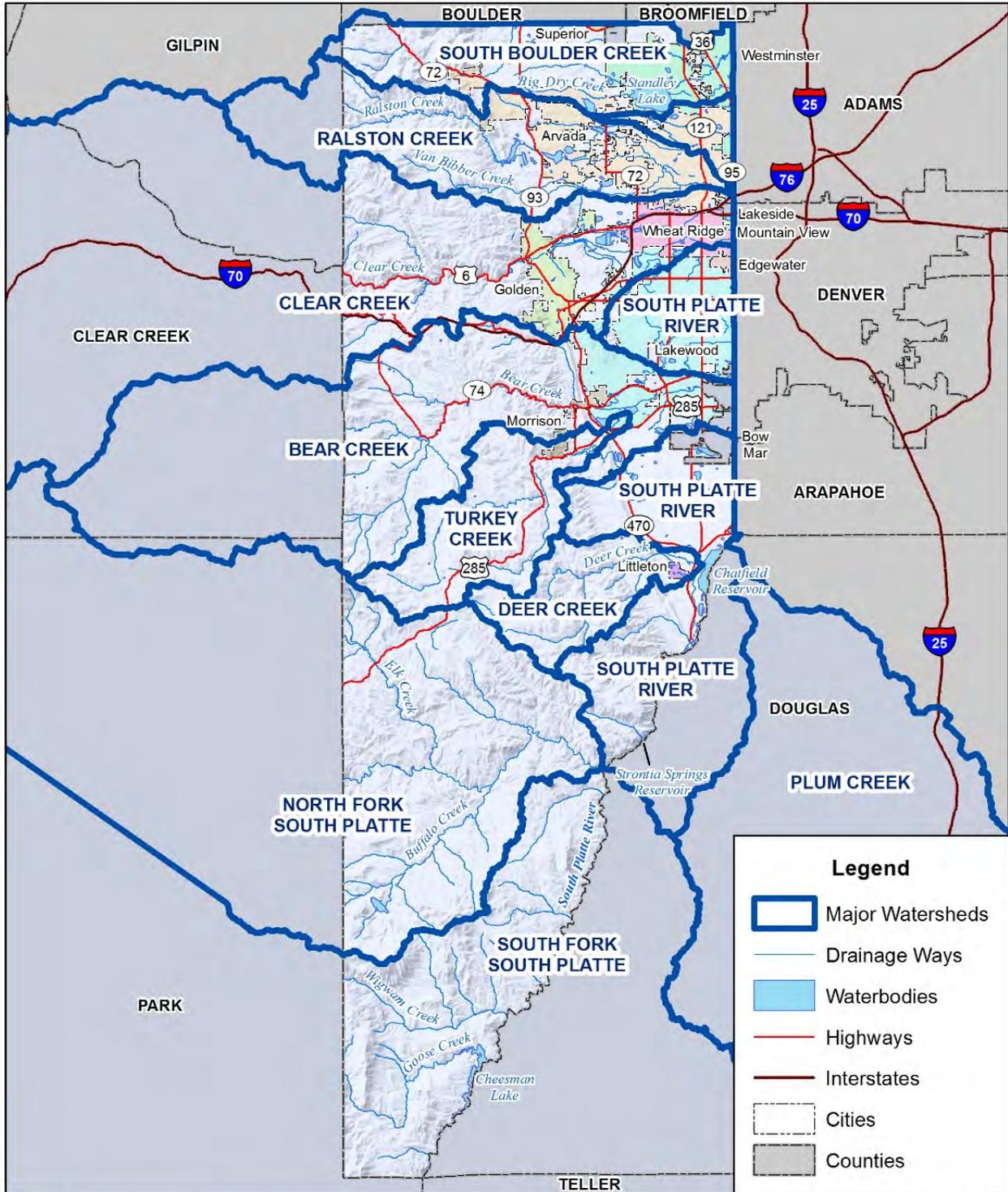
Watershed Drainage Systems

A watershed is an area of land that gets drained by a river and its tributaries. While there are many definitions, scientist and geographer John Wesley Powell put it succinctly when he said that a watershed is: *“...that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community.”*

A watershed's boundaries are defined by areas of higher elevation, such as a ridge or mountain range, from which rain and snow melt runoff flows toward a common low point. In this hazard profile, since the planning area includes unincorporated Jefferson County and its municipalities, the flood history or occurrences are identified by watershed or areas impacted to indicate locations with a higher flood hazard risk. The association between wildfire impacted areas and floods as secondary impacts are also discussed.

Figure 4-35 illustrates the watersheds in Jefferson County.

Figure 4-35 Watershed Map



Map compiled 11/2015;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
NHD

0 5 10 Miles



South Platte River Watershed

The South Platte River Watershed begins high up in the Rocky Mountains at the origin of the South Platte River, and encompasses 28,068 square miles in Colorado, of which the Denver metro area sits squarely in the middle. Jefferson County is located west of Denver and makes up the west metro area Denver suburbs of Lakewood, Golden, Wheat Ridge, Edgewater, Mountain View, Lakeside, Arvada, Westminster, parts of Littleton, and Bow Mar. The foothills communities include the town of Morrison, unincorporated Evergreen, and various urban interface communities along I-70.

The Denver region covers about 535 square miles, all of which are in the South Platte River Watershed. The South Platte River is the main artery of the watershed, and is fed by the many creeks, lakes and minor tributaries that come down from the mountains and hills that surround Denver. Some of these tributaries include South Fork, Middle Fork, North Fork, Clear Creek, Bear Creek, Cherry Creek, and Sand Creek. Clear Creek and Bear Creek run through Jefferson County as they descend from the mountains to the plains. The water that fills Denver’s lakes also eventually makes its way into the streams. In addition, drainage ditches, intermittent streams and, most critically, storm sewers, empty into the watershed. Figure 4-36 illustrates the South Platte River Basin Watershed.

Figure 4-36 South Platte River Basin Watersheds



Source: United States Geological Survey

South Platte River

Description

The South Platte River is one of the two principal tributaries of the Platte River and itself a major river of the American West located in Colorado and Nebraska. It drains much of the eastern flank of the Rocky Mountains in Colorado, as well as much of the populated region known as the Colorado Front Range and Eastern Plains. The South Platte forms the Platte at its confluence with the North Platte River in western Nebraska. The river serves as the principal source of water for eastern Colorado. Its valley along the foothills in Colorado has provided for agriculture in an area of the Colorado Piedmont and Great Plains that is otherwise arid. Its drainage basin also includes a portion of southeastern Wyoming in the vicinity of the city of Cheyenne.

The river is formed in Park County, Colorado southwest of Denver in the South Park grassland basin by the confluence of the South Fork and Middle Fork, approximately 15 miles southeast of Fairplay. Both forks rise along the eastern flank of the Mosquito Range, on the western side of South Park, which is drained by the tributaries at the headwaters of the river. From South Park, it passes through Platte Canyon, which is a deep narrow scenic gorge. The canyon is southwest of Denver on the border between Jefferson and Douglas counties. The canyon, approximately 50 miles in length, also receives the North Fork through the Rampart Range before it emerges on the Eastern Plains where it is impounded to form Chatfield Reservoir, a source of drinking water for the Denver Metropolitan Area.

The river flows north through central Denver, which was founded along its banks at its confluence with Cherry Creek. The valley through Denver is highly industrialized, serving generally as the route for both the railroad lines, as well as Interstate 25. On the north side of Denver, it is joined somewhat inconspicuously by Clear Creek, which descends from the Continental Divide through Clear Creek Canyon following Interstate 70 and Hwy 6 through Clear Creek Canyon entering Jefferson County west of the City of Golden flowing past the Coors Brewing Company. North of Denver the South Platte River flows through the agricultural heartland of the Eastern Plains or Piedmont region (rock formations of sandstone, shale, and limestone that was formed by ocean deposited sediments through erosion of the ancestral Rockies). It flows directly past the communities of Brighton and Fort Lupton, and is joined in succession by Saint Vrain Creek, the Little Thompson River, the Big Thompson River, and the Cache la Poudre River, which it receives just east of Greeley.

East of Greeley it turns eastward, flowing across the Colorado Eastern Plains, past the towns of Fort Morgan and Brush, where it turns northeastward, flowing past the town of Sterling and into Nebraska near the town of Julesburg. In Nebraska, it passes south of the town of Ogallala and joins the North Platte near the town of North Platte, Nebraska.

In an urban area where millions of people live and work, the cumulative actions of a watershed's residents can have a powerful impact on the health of the watershed. On the other hand, in sparsely populated areas of wildland urban interface, careless human-caused wildfires can devastate a watershed leaving it vulnerable to the ravaging effects of post-wildfire flooding. The following flood history is a more recent schedule of events that have occurred post Buffalo Creek, Hi Meadow, and Hayman wildfire burns.

South Platte Watershed Flood History

June 16, 1965 – In mid-June of 1965, heavy spring storms stalled over the Front Range, overwhelming the basins of the Arkansas and South Platte rivers. The magnitude of the rain, floodwaters and subsequent damage defied belief to those who did not witness the storms firsthand. Over three hours, 14 inches of rain fell at Castle Rock. The water was too much for the creeks and arroyos, picking up debris and scraping gouges in the western flank of Dawson Butte that are still visible today. At the juncture of Plum Creek and the South Platte, it was estimated that the river was 200 feet wide and 20 feet deep, moving at ten miles per hour and carrying 40 times its normal flow. In the *Report to the Colorado General Assembly*, total damages from the 1965 floods were estimated at \$397 million with 11 lives lost. Jefferson County emerged relatively unscathed with no officially reported monetary damage or lives lost. This was due to the limited length of the flooded river along the southern county border. Only about one mile of the South Platte River between Plum Creek and Wolhurst was flooded. At the time, this area was rural and sparsely populated (Jefferson County 2014).

July 12, 1996 – On May 18, 1996, a human induced wildfire burned nearly 12,000 acres of the Pike National Forest and surrounding private lands, destroying 10 dwellings and costing millions in suppression costs and property damage. Less than two months later, on July 12, 1996, a high intensity thunderstorm dumped approximately 2.5 inches of rain on the fire ravaged terrain causing severe flooding, which resulted in the washout of Jefferson County Highway 126 and the destruction of the Buffalo Creek community's potable water system and telephone facilities. Major flood flows occurred along Sand Draw, Buffalo Creek, the North Fork of the South Platte River (North Fork) below its confluence with Buffalo Creek, Spring Creek (a tributary to the South Platte River just upstream from the North Fork South Platte River), and several other tributary streams in the area. The storm also resulted in the deposition of hundreds of thousands of tons of sediment into Strontia Springs Reservoir (15-year sediment load), the loss of miles of pristine riparian habitat along Buffalo Creek and Spring Creek drainages. Two lives were lost as a direct result of the flooding. Although the geographic area affected was smaller than in some other floods, the Buffalo Creek flash flood event was truly a disaster. Given the magnitude and quick onslaught of the flood flows, it is nothing short of a miracle that more people weren't killed or injured. The flooding hazards and increased sediment loading potential associated with barren watersheds was dramatically evident at Buffalo Creek after July 12, 1996. Total damages were more than \$4.6 million.

September 14, 1996 – Thunderstorms over southern Jefferson County brought more heavy rain to the Buffalo Creek area. Some minor roads were washed out by flash flooding but no other damage was reported.

July 28, 1997 – Some culverts in the Pine and Conifer areas were washed out due to heavy rainfall.

July 31, 1998 – Heavy rain, up to 3 inches in an hour, caused a flash flood along Buffalo Creek, Portions of County Road 126, just south of the town of Buffalo Creek, were washed out. The floodwaters nearly washed away the bridge as mud and debris slammed into the structure. It was 2 years earlier that a deadly flash flood rushed through the small town killing 2 residents. There was no loss of life or structures, however, large debris accumulations, and disrupting electric, phone and water service for the night. Debris flows were a problem for a number of other mountain towns that evening.

August 4, 1999 - Flooding and flash flooding problems developed over portions of the Urban Corridor as slow moving thunderstorms dumped anywhere from 2 to 3.5 inches of rainfall in approximately 3 hours. Numerous outages were reported with widespread blackouts in Thornton and Littleton. Along Massey Draw in Jefferson County, near Carr Street and Chatfield Reservoir, four homes were flood damaged and portions of their backyards washed out.

July 12, 2000 – Heavy rain fell across a portion of the Hi Meadow burn area near Buffalo Creek, causing localized flash flooding. Approximately three quarters of an inch (0.75) of rain fell in 30 minutes across Miller Gulch. Some culverts became plugged by debris from the fire. As a result, small sections of a forest service road along Miller Gulch were washed out.

July 17, 2000 – An estimated 2 inches of rain reportedly fell in less than an hour in Pine. As a result, two secondary roads in Buck and Miller gulches, in the Hi Meadows burn area, washed out. Water also covered County Road 68 which connects to Bailey. Homeowners in Pine Valley Estates attempted to divert some of the runoff by piling stacks of hay above their homes.

June 19, 2002 - July 21, 2002 – Six flash floods were reported over this 33 day period in the southern portion of the County. Locally heavy rainfall in the Hayman burn area washed out a secondary road. Debris associated with the runoff, blocked a culvert, forcing the water to wash out the road. Gulch Road, which connects to Forest Service Road 211 was washed out. Runoff from heavy rainfall in the Hayman burn area flooded Lost Creek Ranch with up to 18 inches of water, just off of State Highway 126. Floodwaters ruined a very expensive rug in the lodge. Also, a driveway to another local residence was washed out.

May 30, 2003 – Flash flooding was reported in the Hayman burn area in Jefferson County and in southwestern sections of Douglas County, as up to 1 inch of rain reportedly fell in 30 minutes. In Jefferson County, several access roads were washed out.

June 8, 2004 – Locally heavy rain caused flash flooding in the Hayman burn area. Up to a foot of water damaged sections of Trumbull Road and a maintenance road near Lazy Gulch.

August 29, 2007 – Heavy rain caused localized flash flooding in the Hayman burn area, in Southern Jefferson County. The flash flooding forced the closure of County Road 126 and Wigwam Road. Brush and Wigwam Creeks jumped their banks, leaving debris atop the roadway.

July 21, 2009 – Heavy rain produced mudslides in the Hayman burn area. Trees, stumps, sticks, debris, and decomposed granite came down with the mudslides. Most of the damage occurred from Six Mile Creek to Forest Service Road 211 above the Wigwam Fishing Club. Road crews had to totally restore shoulders and slopes and cleaned out ditches downstream of draws and ravines. The mudslides washed out a 250-ft stretch of one shoulder of State Highway 126, near the turnoff to Cheesman Reservoir, and a large section of guard rail was washed out.

September 2013 – Between September 11th and 14th, Colorado's Front Range experienced major flooding and flash flooding. Storms began on September 9, when power was knocked out at the Jefferson County Administration and Courts Facility and in southern Golden, and west Colfax Avenue had to be closed due to torrential rain. Two days later, Highway 72 in Coal Creek Canyon was closed, as was Highway 93 a few days later. Many major roadways were closed by Friday, September 13th; voluntary and involuntary evacuations were in effect in Upper Bear Creek, below Leyden Dam, and from Morrison to Evergreen. Jefferson County's Fairgrounds accepted more than 100 horses, five goats, and two llamas. Rockslides were a major concern in canyons, and prevention efforts occupied emergency crews throughout the foothills.

Bear Creek stood at 8.8 feet above normal flows by Friday night. All the water pouring down from its 164 sq. mile upper watershed was captured in Bear Creek Lake until Monday, September 16, when the Army Corps of Engineers finally began releasing some of the water into the lower drainage systems. By then, floodwaters had raised water elevations in the lake 53 feet, to a new record high of more than 5,600 feet. The previous record, set in 1995, was six feet lower. On September 17th, the Jefferson County Sheriff's Office estimated damage to infrastructure countywide at a "preliminary" \$6,000,000, with 14 residences destroyed, 215 damaged, and 5,805 threatened. Two dozen commercial properties were damaged and another 24 threatened; 200 more "minor" structures were also affected or threatened.

Jefferson County, however, escaped the worst effects, which struck with full force in the northern Front Range. Across the 17 counties affected, eight people died, an estimated 1,500 homes were destroyed, thousands more damaged, and more than \$2 billion in costs incurred, largely by homeowners. Within the county, Coal Creek Canyon, Clear Creek, and Bear Creek were the hardest hit, as the effects of the storms dwindled southward. Clear Creek and Bear Creek remained torrential well into October, but service gradually began to be restored across the county. Most roads and parks hit by flooding reopened within weeks, although repair efforts continued in some places for months after (Jefferson County 2014).

July 7, 2014 – Severe thunderstorms large hail and damaging winds across Arapahoe, Boulder, Elbert and Jefferson County. Heavy rainfall, nearly two inches in one hour, flooded several residences in Evergreen. In addition, several bridges along Forest Estate Road were washed out.

May 9, 2015 – Heavy rain and rising levels of South Turkey Creek washed out many driveways in Indian Hills.

June 14, 2015 – The combination of heavy rain and snowmelt caused minor flooding in southern Jefferson County. Road closures included West Platte River Rd from Buffalo Creek, and sections of South West River Rd and West Pine Creek Rd.

Watershed Health

Watershed health is of utmost importance after a devastating wildfire. There is evidence that a scorched area from wildfire can even attract atmospheric systems, which then dump its moisture on the same soils stripped of its natural defenses. The chances increase for secondary impacts of flooding, erosion, and sedimentation when an area has been burnt from wildfire. There are Federal and State program dollars used to focus on expediting the re-vegetation of wildfire impacted areas to help reduce the devastation of the secondary impacts of flooding.

Bear Creek Drainage Basin

Bear Creek, which rises in the mountains southwest of Denver, is a left bank tributary of the South Platte River. The total drainage area at the mouth is 261 square miles of which 164 square miles are upstream of Morrison. The basin, shown in Figure 4-35 includes parts of Jefferson, Clear Creek and Park Counties, and ranges in elevation from 5,780 feet at Morrison to 14,264 feet at Mt. Evans. Idledale, Kittredge, and Evergreen are towns located in Jefferson County along Bear Creek upstream of Morrison. Major tributaries entering Bear Creek below Evergreen Lake to Morrison include: Cub Creek, Troublesome Creek, Swede Gulch, Cold Spring Gulch, Sawmill Gulch at Idledale and Mount Vernon Creek at Morrison. Bear Creek flows into Bear Creek Lake just east (downstream) of the Dakota Hogback geologic formation at Morrison. This facility is a major flood control reservoir constructed and operated by the U. S. Army Corps of Engineers. East of the hogback, Rooney Gulch enters Bear Creek Lake from the north and Turkey Creek enters the lake from the south. The City of Lakewood Parks Department is responsible for public safety in the park area surrounding Bear Creek Lake. Upstream, the Evergreen Dam is a 380' long, 34' high structure located on the main stem of Bear Creek above Cub Creek at the town of Evergreen, forming a 40-acre lake known as Evergreen Lake. This reservoir is not a flood control facility, but it does impound 670 acre-feet of water.

Turkey Creek Watershed (Part of the Bear Creek Drainage Basin)

The Turkey Creek Watershed is a main drainage basin located along the southeast border of the Bear Creek Drainage Basin.

Turkey Creek Watershed Study

The USGS Mountain Ground Water Resources Study (MGWRS) on the Turkey Creek Watershed was conducted in 1999-2000. The purpose of the study was to better understand water resources, including surface and ground water quantity and quality, in the 47 square mile Turkey Creek Watershed. This study was considered a first step in developing scientifically sound management strategies and for the development of methods to assess ground water availability within different hydrologic settings, evapotranspiration (a term used to describe the sum of evaporation and plant transpiration from the land surface to the atmosphere) and ground water vulnerability to various land uses. Today there is an aggressive Turkey Creek Watershed monitoring program in force. The Precipitation Runoff Modeling System (PMRS) is used to evaluate the amount of precipitation received that is potentially available for ground water storage. The three most important components of runoff are surface runoff, sub-surface flow, and ground water flow. The PMRS results include the percent of precipitation that is returned to the atmosphere by evapotranspiration, the percent that leaves the watershed through surface runoff and subsurface flow, or becomes part of the long-term ground water storage system.

Bear Creek Drainage Basin Flood History

From 1866 to 1973 there have been 24 known floods in the Bear Creek basin; and from 1974 to 2007 there have been 23, which will be discussed later. Most of the floods from 1866 to 1973 were caused by runoff from intense rainstorms during the summer months. However, early season floods were caused from rainfall runoff in conjunction with snowmelt flows. The UDFCD monitors rainfall and streamflow from the Bear Creek basin as part of their early flood warning program, which runs from mid-April through mid-September. The peak discharge measurement at the stream gage on Bear Creek at Morrison in 1896 was 8,600 cubic feet per second (cfs) and the peak discharge on Bear Creek downstream of the gage below the confluence of Mount Vernon Creek during the 1938 flood was estimated to be considerably more than 10,000 cfs. The peak flow rate for Mount Vernon Creek alone was estimated at 9,230 cfs, which is more than twice the magnitude of the 100-year flood.

Mount Vernon Creek enters Bear Creek downstream of the Morrison Stream gage and has a drainage area of only 9.4 square miles. The headwaters of Mount Vernon Creek are at Genesee where I-70 begins its climb into the mountains along Mount Vernon Canyon. The south side of Lookout Mountain also drains into Mount Vernon Creek. At the Dakota Hogback the creek turns south, passing through Red Rocks Park and continuing to its mouth at Morrison, where a very narrow, confined stream channel exists.

A stream gage located east of Bear Creek Lake at Lowell Blvd and Sheridan has continuously measured Bear Creek flows since 1927. The Morrison gage has partial records dating back to 1888 and continuous records since 1922. When comparing the gage records it can reveal variances in peak discharges for

each flood event. This indicates the majority of flood drainage came from two different locations. For example, in the 1933, 1934 and 1938 floods, the storms were concentrated in the foothills and mountains of Bear Creek, and the resulting flood peaks attenuated between Morrison and Sheridan. For the 1957, 1965, 1969, and 1973 floods, the majority of runoff occurred from watershed areas downstream of Morrison or from Turkey Creek.

Bear Creek floods are characterized as rapid concentrations of runoff, sharp peak discharges, and rapid flood recession. Peaking time for floods on Bear Creek at Morrison is about 3 to 5 hours after the causing rainfall, while floods on Mount Vernon Creek peak between 1 and 3 hours.

Turkey Creek was the known principal contributor for the 1957, 1965, 1969 and 1973 flood events.

May 21-23, 1876 – Reported by the Denver Tribune on June 5 of that year; "... informs us that one resident had never seen such destruction in the region... He spent some days in the valleys of Soda and Bear Creeks and their tributaries and found new gullies worn to the depth of 20 feet in the action of the raging torrents."

May 29-June 1, 1894 – In the vicinity of Morrison, a flood that caused the loss of bridges, railroad tracks, houses, and destroyed the highway in the canyon.

July 24, 1896 – Intense rainfall centered on Cub Creek, a tributary of Bear Creek near Evergreen. "Without a moment's warning the largest flood that ever came down Bear Creek struck Morrison about 8 o'clock tonight (July 24), sweeping everything in its path ... although the water came down through the town nearly 3 feet deep in the main street, the buildings in the business section all withstood it." Twenty-seven lives were lost in the flood (available records do not indicate where the deaths occurred) and severe damages were reported from Evergreen to the mouth of Bear Creek. No rainfall records of this flood are available. The peak flow on Bear Creek at the Morrison gauging station was estimated at 8,600 cfs, which is the flood of record for the gage. The most recent hydrologic studies indicate that this flood would have a one in 40 chance of occurring in any year. It is not known to what extent Mount Vernon Creek contributed to the Morrison flooding. The Flood of 1896 was the most catastrophic flash flood to hit Bear Creek Canyon. Farms along Cub Creek were obliterated. "The water descended about Evergreen like a huge, moving wall carrying houses, sheds, barns and livestock with it", according to the news. It was determined after the news account that 29 lives were actually lost.

July 7-8, 1933 – "Five persons known dead ... property damage of un-estimated degree and nearly all the highways between Mt. Morrison and Idledale ruined, is the toll up to date of one of the most devastating floods last Friday afternoon (July 7) ever to visit the Bear Creek Watershed. A cloudburst at about 1 o'clock in the neighborhood of Idledale sent a wall of water down Saw Mill Gulch leading to Bear Creek, and another raging torrent down Vernon Creek. ... The Vernon Creek waters reached a height of 15 feet ... in the narrow passage between the business houses. The highway up beautiful Bear Creek Canyon between Mt. Morrison and Idledale is practically ruined." The peak discharge at Morrison was 8,000 cfs on Bear Creek and estimated as 1,500 cfs on Mount Vernon Creek.

August 9, 1934 – The flood of August 9, 1934 in the Bear Creek basin was caused by cloudburst-type rainfall near Kittredge and at the head of Mount Vernon Creek. Six lives were lost and much property damage resulted. It was reported that Mount Vernon Creek ran higher than the previous year and much of the canyon roadway was destroyed. Damage to Morrison was reduced because the Bear Creek peak flow passed through the town before the Mount Vernon Creek high water arrived.

September 2-3, 1938 – A widespread thunderstorm that began over the eastern slope of the Front Range on 30 August became most intense in the Morrison area on 2 September. An unofficial report stated that 7.9 inches fell just north of Morrison in six hours. The heaviest rainfall centered on the divide between Bear Creek and Mount Vernon Creek. The peak discharge on Bear Creek at Morrison above Mount Vernon Creek was 6,200 cfs. From post flood measurements the Mount Vernon Creek peak discharge was estimated at 9,230 cfs at a point 1/2 mile upstream from Morrison. From statements by local residents, it appears that the peak discharge on Mount Vernon Creek reached Morrison at about 7 p.m., preceding that on Bear Creek by 1/2 hour. Six persons drowned when trapped in their automobile between Morrison and Kittredge. Damages in the basin were estimated at \$450,000. If Morrison had not

been warned, or if the flood had occurred late at night, the number of deaths would likely have been considerably higher.

August 24, 1946 – A heavy rain near Idledale caused Bear Creek to overflow. A Morrison woman was swept from her stranded car and drowned.

August 21, 1957 – Thunderstorms occurred over the Bear Creek basin with heavy rain and hail beginning about 1 p.m. east of Squaw Pass and northwest of Evergreen. At most locations the rain stopped within an hour. The Mount Vernon Creek peak discharge at Morrison was estimated at 1,000 cfs at 2:30 p.m., and 1,640 cfs on Bear Creek at about 3 p.m. While most damages from Bear Creek occurred downstream of Morrison, which is a drainage from Turkey Creek. Mount Vernon Creek left debris on the grounds of six or seven residences in Morrison, flooded a garage and a used car lot, and broke a water main. State Highway 8 at Morrison was closed upon warning of the flood. Later, portions of the highway were flooded by both streams.

July 25, 1965 – On 23-24 July 1965, heavy rains over the headwaters of Bear Creek caused minor flooding throughout its length. Most damages occurred downstream of Morrison. A peak discharge of 1,030 cfs was measured for Bear Creek at Morrison on July 25, 1965.

May 7, 1969 – Heavy rains from May 4-8, 1969 resulted in flooding in the Bear Creek basin with most damages occurring downstream from Morrison. A weather station at Morrison reported a total storm rainfall of 11.27 inches, with a maximum daily amount of 5.77 inches. Unofficial rainfall amounts in the basin varied from 6.7 inches to 11.8 inches during the five-day storm period. The peak flow for Bear Creek at Morrison was 2,340 cfs on May 7, 1969.

May 6, 1973 – The last significant flood to cause damages in the Bear Creek Basin. According to the National Weather Service, damages from the flood were estimated at around \$120 million. The following damage estimates were printed in the Denver Post on May 13, 1973. Damages estimates in Weld County, hardest hit by the flood, were \$20 million. In Adams County, the estimate was \$8 million. In Denver, the estimate had climbed to well over \$6 million and in Jefferson County, officials reported over \$500,000 damage to roads, culverts, and other County property. Two deaths were attributed to this event.

“The 1973 flood was the last big flood in Denver” (Brian Schat, Denver Public Works, personal communication 8/22/03). Rainfall was widespread along the Front Range with totals ranging from one to five inches. A sustained downpour dropped more than three inches in the Denver metropolitan area on Sunday, May 6. In the foothills, heavy snow fell.

Most of the damage was a result of river flooding. The South Platte was four feet above flood level at its crest when it measured 10.85 feet at the 19th Street Bridge early on the morning of May 7. The flood stage of the South Platte at W. Evans Ave. equaled that during the 1965 disaster. However, this flood was more of “a steady overflowing of water” as opposed to the “one surge” Denver experienced during the flood of 1965.

The South Platte flooding was compounded when normally dry gulches and tributaries from the mountains west of Denver became turbulent flows that emptied into the river. When Bear Creek reached southwest Denver, it had grown to be 150 yards wide in spots. Plum Creek and Indian Creek, other South Platte tributaries, also poured out of their banks, virtually isolating the town of Louviers. In Englewood, the Highline Canal and the normally dry Little Dry Creek both overflowed.

Before evacuations were ordered in Denver, water began rising in Turkey, Bear, and Clear Creek Canyons because of the heavy snow runoff on May 5. By May 6, several Jefferson County roads in those areas had been washed out and residents had to be evacuated. In addition, several rockfalls and debris flows forced road closures.

Flooding in the Bear Creek watershed has killed 45 people and caused extensive property damage since the area was settled. It is idyllic for tourists and recreation seekers, unfortunately, under the right conditions Bear Creek Canyon and its tributaries can become death traps in a short amount of time. It doesn't take much rain to create a devastating flash flood. Retired Captain from the Jefferson County Sheriff's Office and historian, Dennis Potter, has documented 15 major floods that have taken place

between 1864 and 1938. Of the 15, two occurred in May, one in June, eight in July, two in August, and two in September.

September 2013 – The damage associated with the widespread Front Range flood event was largely north of the Bear Creek Watershed, but damage

Clear Creek Watershed Drainage Basin

Located west of Denver, the Clear Creek Watershed spans 575-square miles from the 14,000-ft. mountain peaks along its southwestern edge on the basing and part of the Continental Divide, to the urbanized plains at its confluence to the South Platte River just north of Denver. The Clear Creek Watershed is the source of drinking water for more than 300,000 people. Clear Creek also provides water for irrigation, recreation and industry. Four hundred square miles of the watershed are located in the mountains west of Golden, and fully one-third of the Clear Creek Watershed lies within the Arapahoe & Roosevelt National Forests.

Clear Creek's headwaters begin in an area rimmed by four 14-ers (mountains that are 14,000 feet in elevation or higher) – Grays and Torreys Peaks, Mt. Evans, and Mt. Bierstadt. Major tributaries that feed into Clear Creek include the North, South and West Forks; Leavenworth, Lion, Trail, Chicago, Soda and Ralston Creeks; Fall River; Tucker Gulch; Kenneys Run; Lena Gulch; Little Dry Creek (confluence in Adams County); and Beaver Brook. The main-stem flows eastward along the Interstate 70 (I-70) corridor, through several communities, along approximately 12 miles of Highway 6 corridor through the Clear Creek Canyon and then back along the I-70 corridor through several Denver Front Range Communities.

Clear Creek

Clear Creek is a tributary of the South Platte River, approximately 40 miles long, in north central Colorado in the United States. The creek drains a canyon, called Clear Creek Canyon in the Rocky Mountains directly west of Denver, descending through a long gorge to emerge on the Colorado Eastern Plains where it joins the South Platte. The creek is famous as the location of the most intense early mining activity during the Colorado Gold Rush of 1859. The creek provided the route of the Colorado Central Railroad and later for the United States Highway 6 and Interstate 70 as they ascend to the Continental Divide west of Denver.

The creek begins near the continental divide in the Front Range, northwest of Grays Peak in western Clear Creek County. It descends eastward through Clear Creek Canyon past the towns of Silver Plume, Georgetown, and Idaho Springs, all of which were founded as mining camps in the 1859 gold rush. Within the canyon it receives numerous smaller tributary creeks that descend from the rugged mountains on either side.

At the mouth of the canyon, in Jefferson County, the creek passes through the town of Golden, past the Coors brewery. East of the foothills, it flows through the northwest part of the Denver Metropolitan Area, passing through Wheat Ridge, southeastern Arvada, then roughly along the route of Interstate 76 (I-76). Along this section it is largely an undeveloped urban stream, with an undeveloped floodplain. Part of the creek path forms a wooded park with bicycle/foot path. It passes under Interstate 25 (I-25) between its junction with Interstate -70 (I-70) and U.S. Highway 36 (Hwy 36 - the Boulder-Denver Turnpike). It joins the South Platte from the west in southeast Thornton, near the junction of Interstate 76 (I-76) and State Highway 224 (Hwy 224).

Clear Creek Watershed Flood History

The Mile High Flood District (MHFD), formally known as the Urban Drainage and Flood Control District (UDFCD), under joint sponsorship with the City and County of Denver, City of Wheat Ridge, City of Golden, Adams County, Jefferson County and ICON Engineering, Inc. conducted a study, *Planning and Flood Hazard Delineation Area for Clear Creek Drainageway*, which extends from Sheridan Boulevard at the downstream study limit to the City of Golden in Jefferson County, at the upstream study limit. The drainage area at the location of the Golden gage near the bluff line is approximately 400 square miles. From Golden, Clear Creek flows in a northeasterly direction, through the Denver Metropolitan Area to its confluence with the South Platte River, near Derby. At the Derby gage, located approximately 0.6 miles upstream from the mouth, Clear Creek has a drainage area of approximately 575 square miles.

Elevations within the Clear Creek basin range from approximately 5,100 feet above mean sea level at the mouth to over 14,000 feet above mean sea level in the Rocky Mountains.

The intent of the report is to evaluate and document the existing floodplain along Clear Creek so that project stakeholders, and other users, can implement floodplain zoning ordinances, floodplain regulations, and other land-use controls, as needed, to reduce potential damages and adverse development in the floodplain. This report provides information on past flooding events and defines the nature and extent of probable future floods along an 11.6 mile reach of Clear Creek, from Sheridan Boulevard to approximately 2,200 feet upstream of Highway 6 in the City of Golden. Discharge information along Clear Creek was originally computed by the U.S. Army Corps of Engineers (COE) and incorporated into previous Flood Hazard Area Delineation (FHAD) and Master Planning documents. Historically, flooding in the Clear Creek basin has been relatively infrequent. Since 1864, twelve floods have been reported on Clear Creek and its tributaries. The following descriptions include the floods of August 1888, July 1890, June 1956, and July 1965 (Gingery 1979).

Flood of August 1888 – This flood resulted from cloudbursts on the eastern slope of the Front Range of the Rocky Mountains. A discharge of 8,700 cubic feet per second (cfs) was reported at the mouth of Clear Creek canyon. This is the largest estimated peak discharge in the history of this gauging station, which is located 1.5 miles upstream from Golden.

July 19, 1890 – A severe rainstorm began after a long dry spell, causing Clear Creek to flood. Flood waters reached Golden at 4:00 p.m. on the 20th. The deaths of two women and an 18-month-old baby were attributed to the flood.

July 26, 1923 – Cloudbursts in the foothills above Golden caused floods in all the gulches that enter Clear Creek from the north within 2 miles of Golden. At the mouth of Magpie Gulch the rainfall was moderate, but half a mile above it was a cloudburst. The rain began about 12:45 p.m. and the flood reached its crest by 1 p.m. and then fell so rapidly that by 1:40 p.m. the flow in the gulch was again normal. This flood deposited a gravel and boulder dam 10 feet high entirely across Clear Creek, a distance of about 70 feet. Some of the boulders moved by the flood weighed as much as 5 tons.

June 6, 1948 – there was a flash flood in Tucker Gulch, a left bank tributary to Clear Creek in Golden. The peak discharge in Golden was 11,600 cfs and there were substantial flood damages. This flood from the 11.2 mi² basin is nearly twice the largest flood in Clear Creek (~400 mi²). This is one of the largest, if not the largest, flood for this size watershed in Colorado.

Flood of June 1956 – Unusually heavy snowmelt runoff resulted in the failure of the Georgetown Dam located about 1 mile downstream from Georgetown. The peak discharge passing the gage above Golden was 5,250 cfs. By the time the crest reached the gauging station near the mouth of Clear Creek, it was reduced to 2,880 cfs.

Flood of July 23-26, 1965 - On July 23 and 24, during severe storms over the headwaters of Clear Creek and Tucker Gulch, 4.5 inches of rain was reported to have fallen in Tucker Gulch in an hour, which caused flash flooding in Golden, however, flooding extended only a short distance downstream. In Golden, flood waters from Tucker Gulch spread over about 17 blocks and caused an estimated \$112,000 damage to 69 residences, three commercial enterprises, three railroad bridges, four street bridges, and utility lines. At Georgetown, debris blocked the channel and diverted the waters down a street, thereby causing extensive washing of the surface and the flooding of several basements.

July 29, 2003 – Heavy rainfall caused flooding and flash flooding problems in north central Jefferson County. Officials were forced to briefly close State Highway 93, north of Golden, which was flooded by runoff and littered with debris. In Golden, flash floods left several backyards and basements full of standing water. At least one car was submerged in a garage. Radar estimated 1 to 1.5 inches of rain had fallen in the area in approximately 30 minutes.

June 8, 2004 – In Golden, heavy rains triggered a small debris flow on U.S. Highway 6, near the intersection of Colorado Highway 119. Automated gages in the area registered 2 to 3 inches of rain in one hour. Near the Colorado Mills Mall in the Lena Gulch drainage basin, numerous intersections were inundated from 1 to 3 feet of water and hail, stranding several vehicles, including a fire engine. Approximately 30 basements were flooded in Golden and Lakewood and many windows, to both cars and

homes, were broken by large hail. June 8th was the first of five days in which flash flood warnings were issued for the UDFCD area. Seven other days warranted flash flood watches, making 2004 one of the most active flood seasons in the 26-year history of the District's flash flood prediction program. Fortunately, no lives were lost and the flooding that did occur was localized with total damages not reaching disaster proportions. An early morning cold front set the stage for 2004's first outbreak of flood producing storms. Around 8 p.m. storms began developing along the urban foothills of Jefferson County. Over the next two hours, Golden, Lakewood, Wheat Ridge, and nearby areas were pounded by heavy rain and hail. The Colorado Mills shopping mall was hit especially hard with over 3 inches of rain in 90 minutes. Homes were flooded and streets were closed in the vicinity of W. 32nd Ave. and I-70 where an unconfirmed precipitation measurement of 5" was reported. A Golden firefighter stated that flood fighting at the intersection of 20th Street and Washington was like working a swift water rescue. Hail depths up to 18 inches were reported in some areas and motorists in Lakewood were rescued from cars.

June 27, 2004 – A deluge of very heavy rain from nearly stationary thunderstorms caused flooding and flash flooding problems over parts of Jefferson County. In Jefferson County, an automated rain gauge north of Golden measure 3.6 inches of rain in one hour. Numerous homes were flooded in Golden, including one that was 146 years old. The home was listed as a complete loss. In addition, State Highway 93 had to be closed from the Pine Ridge subdivision (near 6th Ave and Hwy 93) to Golden Gate Canyon Road. At the height of the storm, about 4 feet of water covered Colorado 93 through Golden, forcing its temporary closure. Rockfall and debris flows were also reported in Golden Gate Canyon. Several intersections were also flooded and impassable. The worst flooding in Golden occurred along a small drainage known as Arapahoe Gulch, which runs along the west side of Washington Street. Affected residents there may have a similar predicament with regard to flood insurance since the hazard area associated with Arapahoe Gulch is not shown on the Flood Insurance Rate Map. The storm that caused this flooding produced between 3.5 and 4 inches of rain over the watershed. Based on surveyed high water marks and debris lines, peak flow rates in Arapahoe Gulch during the June 27 event were approximately 400 cfs. The peak flow estimate was nearly a 200-year event and greatly exceeded the capacity of the Arapahoe Gulch drainage system downstream of 2nd Street.

August 3, 2006 – Heavy rain caused flash flooding along Leyden Creek in unincorporated Jefferson County, northwest of Arvada. An automated rain gauge in upper Leyden Creek, 6 miles northwest of Arvada, measured 2.68 inches of rain in less than two hours. Two to three feet of water covered the roadway at 82nd and Quaker. Leyden Creek is a tributary to Ralston Creek.

September 2013 – See the dam failure section for a description of flooding during 2013.

May 2015 – Sustained rainfall in the month of May caused many creeks and drainages to be bank full and causing minor overbank flooding including along Leyden Creek in Arvada.

Coal Creek Watershed

The Coal Creek Watershed drains almost 80 square miles in southern Boulder County and northern Jefferson County and is part of the South Boulder Creek Watershed. The watershed is approximately 28 miles long and an average of 3 miles wide, with an elevation drop of about 5,500 feet. The drainage begins in the foothills east of the Rocky Mountains, and flows through Superior, Louisville, Lafayette, Erie, and the City and County of Broomfield until it reaches Boulder Creek. The existing land use within the watershed is about 61 percent open space and parks. Rural residential development makes up approximately 16 percent of the existing land use, while residential, commercial, industrial and roadways comprise another 16 percent of the watershed. Public facilities, such as schools, comprise about 7 percent. Approximately 45 percent of the watershed is considered developed, with the lower end still developing.

The Coal Creek Watershed suffered a heavy rainfall event on September 12, 2013 that caused large amounts of channel migration that resulted in erosion and deposition. More information on this can be found in the Erosion and Deposition section of this document.

Ralston Creek Watershed

Ralston Creek is a tributary of Clear Creek, approximately 15 miles long. It drains a suburban and urban area of the northwestern Denver Metropolitan Area. It rises in the foothills in northeastern Gilpin County,

in southern Golden Gate Canyon State Park. It descends through a valley eastward into Jefferson County following Drew Hill Road (County Road 57), emerging from the mountains approximately 3 miles north of Golden, where it is impounded to form Ralston Reservoir west of State Highway 93 and the Arvada/Blunn Reservoir on both sides downstream of State Highway 93. It flows eastward through Arvada and joins Clear Creek from the north in southeast Arvada, near the intersection of Sheridan Avenue and Interstate 76. The U.S. Army Corps of Engineers funded a flood and erosion control stream improvement project to the 100-year floodplain along Ralston Creek at the location of the Garrison Street Bridge in 2005.

Deer Creek Watershed

Deer Creek created Deer Creek Canyon. It is an important riparian corridor between the hogback and Wetlands Conservation Areas. It is a rich butterfly habitat and a large portion of it is protected by the Deer Creek Canyon Park, which encompasses diverse, natural environments. Perhaps most striking is the scrub oak habitat, uncommon in Jefferson County. Although small in stature, the scrub oak provides important food and cover for wildlife including grouse, turkey, mule deer, elk, mountain lion, and black bear. Deer Creek discharges directly into Chatfield Reservoir.

Significant Jefferson County Gulches

As mentioned above there are over 90 gulches, canyons and draws in Jefferson County. Some gulches, where there is a high vulnerability to larger numbers of populations, are discussed in further detail below.

Lena Gulch

Lena Gulch is a tributary of Clear Creek with a confluence near 41st Avenue and Kipling Street. The total drainage area for the basin is 13.3 square miles. Lena Gulch is predominantly in the City of Wheat Ridge, but also through Golden, the Pleasant View area, Lakewood, Wheat Ridge and parts of unincorporated Jefferson County. The lower reach of Lena Gulch begins at Maple Grove Reservoir, which is a water storage reservoir operated by the Consolidated Mutual Water District Company. The drainage basin entering Maple Grove Reservoir is 10.5 square miles. Typically, low flows from the upper basin pass through the reservoir and are released downstream. The lower basin has a drainage area of 2.8 square miles. Lena Gulch is unusual for a small foothills stream in that it has a constant base flow. This makes for an attractive stream setting with riparian zones and aquatic flora and fauna along the corridor. There are several areas of concern along Lena Gulch. Discussions for flood control projects are currently under way across several jurisdictions. Lena Gulch will be further discussed in the jurisdictional annex for the City of Wheat Ridge. A complete study of the Flood Hazard Area Delineation for Lena Gulch has been created.

Lena Gulch Flood History

July 27, 1997 – Heavy rain caused Lena Gulch to surge 2 feet over its banks. The fire department had to rescue a man when his van stalled in the high water.

August 10, 1998 – Heavy rain caused flooding and flash flooding problems over southwest portions of Metropolitan Denver. An observer in Lakewood recorded 3.26 inches of rainfall in one hour. Several streets were flooded in central Lakewood. In addition, a trailer park along Lena Gulch in Wheat Ridge was evacuated due to the high waters.

June 8, 2004 – Heavy rain and large hail caused flooding and flash flooding across northeast Jefferson County. Automated gages in the area registered 2 to 3 inches of rain in one hour.

Lakewood Gulch

Lakewood Gulch is a well-defined drainageway. It originates on the northwest slopes of Green Mountain in Lakewood, flows east through Sixth Avenue West Park, and continues east through Lakewood into Denver, where it joins the South Platte River southwest of the intersection of I-25 and Colfax Avenue. A small portion of the studied length of Lakewood Gulch is in unincorporated Jefferson County, while the predominant length lies in Lakewood. Lakewood Gulch will be further discussed in the jurisdiction annex for the City of Lakewood. A complete study of the Flood Hazard Area Delineation for Lakewood Gulch has been created.

Lakewood Gulch Flood History

August 21, 1998 – While no flash flood warning was issued for the August 10th storm, extensive urban flooding did occur in Lakewood and Denver. Between 4:45 and 5:45 P.M., 3.26 inches of rain was measured in Lakewood near the intersection West 1st Ave. and Balsam Street. Rush-hour traffic was at a crawl while many homes had their basements flooded. Vehicles were floating in the Wal-Mart parking lot where the floodwater was 3 to 4 feet deep. This parking lot is located in the floodplain of South Lakewood Gulch near West 2nd Ave. and Wadsworth Blvd. East of Kipling Street, McIntyre Gulch was out of its banks at a number of locations. Lakewood Gulch in Denver overtopped Wolff Street by at least 3 feet. This event contributed directly to a Lakewood City County action exactly 2 weeks later endorsing a plan to form a stormwater utility and establish a fee of \$0.88 a month for each 1,000 square feet of impervious surface area, costing the average homeowner \$1.98 per month.

May 14, 2007 – a mother and her toddler got trapped in a flash flood on Lakewood Gulch in Denver. They were taking a walk along the gulch trail when it started to hail. They attempted to escape the hail from the storm by going further down into a small box culvert underneath Decatur Street adjoining the creek as it travels under Decatur Street in Denver. The mother lost the grip of her toddler's stroller and the child was swept downstream. He was found dead a few days later a few miles away on the banks of the South Platte River. After the incident, the bike path adjoining the creek was permanently closed.

July 20, 2019 – A thunderstorm produced a flash flood in southern Jefferson and southwest Denver counties. Rescue crews searched Lakewood Gulch, after the report of a person in the water near West 12th Avenue and Miller Street. Her body was found in 10 ft of water the following day along Lakewood Gulch near West 12th Avenue and Lee Street. There were reports of West Colfax Avenue in Lakewood being inundated with water. There was up to 3 feet of water on other streets in Lakewood. One woman was rescued by a passerby in Lakewood when floodwaters began pouring into her car near the iconic Casa Bonita restaurant.

Past Occurrences

A discussion on previous occurrences of flood events is organized under each major watershed above.

Probability of Future Occurrences

There have been 48 floods in Jefferson County recorded since 1876; however, 38 of them (35 recorded by the NCEI, 3 recorded by NWS and a number of others by MHFD) have occurred since 1950, or a span of 70 years. The methodology for calculating the probability of future occurrences using the number of incidents from 1950 is described in Section 4.3.1. This formula evaluates that the probability of a flood occurring in any given year is 69%. This corresponds to a probability of future occurrences rating of **likely**.

If the total number of flood incidents is used (48) over a period of 144 years, the probability of a flood occurring in any given year is 33%. This still corresponds to a probability of future occurrences rating of **likely**. A 100-year flood has an annual probability of 1%. A 500-year flood has a 0.2% chance of occurring in any given year.

Magnitude and Severity

Magnitude and severity can be described or evaluated in terms of a combination of the different levels of impact that a community sustains from a hazard event. Several factors contribute to the relative vulnerabilities of certain areas in the floodplain. Development, or the presence of people and property in the hazardous areas, is a critical factor in determining vulnerability to flooding. Additional factors that contribute to flood vulnerability range from specific characteristics of the floodplain to characteristics of the structures located within the floodplain. The following is a brief discussion of some of these flood factors which pose risk.

- **Elevation:** The lowest possible point where floodwaters may enter a structure is the most significant factor contributing to its vulnerability to damage, due to the higher likelihood that it will come into contact with water for a prolonged amount of time.
- **Flood depth:** The greater the depth of flooding, the higher the potential for significant damages due to larger availability of flooding waters.

- **Flood duration:** The longer duration of time that floodwaters are in contact with building components, such as structural members, interior finishes, and mechanical equipment, the greater the potential for damage.
- **Velocity:** Flowing water exerts forces on the structural members of a building, increasing the likelihood of significant damage (e.g. such as scouring).
- **Construction type:** Certain types of construction and materials are more resistant to the effects of floodwaters than others. Typically, masonry buildings, constructed of brick or concrete blocks, are the most resistant to damages simply because masonry materials can be in contact with limited depths of flooding without sustaining significant damage. Wood frame structures are more susceptible to damage because the construction materials used are easily damaged when inundated with water.

Specific examples of negative impacts from flooding on Jefferson County span a comprehensive range and are summarized as follows:

- Floods cause damage to private property that often creates financial hardship for individuals and families;
- Floods cause damage to public infrastructure resulting in increased public expenditures and demand for tax dollars;
- Floods cause loss of personal income for agricultural producers that experience flood damages;
- Floods cause loss of income to businesses relying on recreational uses of County waterways;
- Floods cause emotional distress on individuals and families; and
- Floods can cause injury and death.

Note that the terms 1% annual chance flood and 0.2% change annual flood, described above as measures of frequency, are also used as a shorthand to describe magnitude, particularly in terms of flood depth.

Jefferson County is uniquely located covering very populated urban areas as well as wildland urban interface foothills. Areas burned by wildfire tend to have a high runoff, resulting in flash flooding in those areas. Hilly terrain, coupled with brief, heavy summer downpours can result in flash flooding in many areas in the County. Fast-moving water is extremely powerful. The result can be deadly to anyone in the water's path. The force of flash flood waters can be extremely dangerous to motorists who unwittingly or unknowingly drive over water-covered roads - only two feet of running water are needed to sweep away a car. Risks to life and property can be very high during periods of flash flooding.

The magnitude and severity of the flood hazard is usually determined by not only the extent of impact it has on the overall geographic area, but also by identifying the most catastrophic event in the previous flood history. Sometimes it is referred to as the "event of record." There are differences in how the various natural hazard events are recorded and therefore do not apply across the hazards equally. For this reason additional data was taken into consideration to define the term "flood of record." Normally a flood of record relates to official stream-flow information available from the USGS and other sources, which include the National Weather Service and Urban Drainage and Flood Control District. The "flood of record" is almost always correlated to a peak discharge at a gage, but that event may not have caused the worst historic flood impact in terms of property damage, deaths, etc.

The 1938 flood illustrates this point well. It was likely the most devastating flood that Morrison has ever experienced; however, the '38 flood was not the largest historic stream-flow measurement for the Bear Creek at Morrison gage. The 1896 Black Friday Flood peak discharge was 8,600 cfs versus 6,200 cfs for the 1938 flood. In 1933 the Bear Creek gage recorded a peak discharge of 8,110 cfs and deaths occurred, but the 1938 flood caused far more damage to the town.

With this said, it is important to evaluate all the variables when attempting to identify a "flood of record." The 1965 flood received much media attention along Plum Creek in Douglas County and along the South Platte River through Denver, but Jefferson County sustained its share of damages as well. When major floods happen, lesser impact areas from the same event are given less attention by the media. To get a handle on the flood year that caused the most damage, additional research was necessary. NFIP claims statistics for the past 30 years were considered, however, the two worst flood damage years predated the NFIP. Inflation adjustments were also calculated. The accumulated data pointed to the 1896 Black Friday

Flood to be the “flood of record.” There were 29 lives lost and devastation from Evergreen to the mouth of Bear Creek wiping out everything in its path. Farms were destroyed along with the livelihoods of most of those who lived in the area. The City of Golden was under siege by floodwaters coming in from two directions taking out all bridges and shutting down the electric plant. Miles of railroad tracks were twisted like pretzels up Clear Creek, and the town of Morrison was a mass of wreckage and ruin. Enormous amounts of debris were strewn from the mountains to the plains of Denver. It was considered an economic catastrophe of its time where reconstruction took years. A future event of this magnitude could have similar devastation to Morrison and Golden. Based on these factors, the magnitude severity ratings for flood are considered **critical**.

Climate Change Considerations

According to the National Oceanic and Atmospheric Administration, there is generally more rain and snow falling in the Northern Hemisphere and precipitation has increased by about 5% over the last century. An increase in precipitation alone is not immediately alarming, but “factors such as precipitation intensity, soil moisture and snow conditions, and basin topography are also important in determining the occurrence and severity of flooding.” As with temperature, it is the extremes that matter most with regard to rainfall. According to Robert Hanson, author of *The Thinking Person’s Guide to Climate Change*, “Data shows a clear ramp up in precipitation intensity for the United States, Europe, and several other areas over the last century, especially since the 1970s. When it rains or snows in these places, it now tends to rain or snow harder, over periods ranging from a few hours to several days.” Additionally, with wildfires already being a problem in many parts of Colorado, increasing periods of drought and lack of precipitation are expected to exacerbate conditions for fires to occur, and in turn worsen the potential for runoff and flooding associated with burned areas.

These events can lead to increased infrastructure damage, injury, illness, and death. Additionally, warmer temperatures in the winters may cause increased precipitation to fall as rain instead of snow in mountain regions of Colorado. This may lead to elevated stream flows and increased flood risk across the state. As climate science and data evolves it will be important for communities in and around Jefferson County to address how our changing climate will affect how water moves through local streams and regional landscapes.

Vulnerability Assessment

General Property

Floods pose a significant risk to existing development in the planning area. In addition to the enormous economic loss potential associated with flood hazards, floods have historically been a source of significant loss of life in the planning area.

A flood vulnerability assessment was performed for Jefferson County using GIS. The county’s address point layer and associated assessor’s building improvement valuation data were provided by the county and were used as the basis for the inventory. The latest FEMA NFHL data along with the Jefferson County parcel layer provided by the Assessor’s Office. FEMA’s NFHL data depicts the 1% annual chance (100-year) and the 0.2% annual chance (500-year) flood events. Flood zones A, AE, AH and AO are variations of the 1% annual chance event and were included in the analysis. The Shaded Zone X along with the subtype 0.2% annual chance hazard zone were used to represent the 500-year flood event.

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 (with the exception of Exempt parcels, which were included regardless of improvement values); this assumes that improved parcels have a structure of some type. The FEMA flood zones were overlaid in GIS on the parcel centroid data to identify structures that would likely be inundated during a 1% annual chance or 0.2% annual chance flood event. Property improvement values for the points were based on the assessor’s parcel data and summed by parcel type and jurisdiction across the county.

Results of the overlay analysis are summarized in Table 4-38 and Table 4-39; further details are shown in Table 4-40 and Table 4-41 by property type. Contents values were estimated as a percentage of property improvement values based on their occupancy type, using FEMA HAZUS guidance as follows: a) Commercial parcels received content values worth 100% of their improvements; b) Residential parcels

received content values worth 50% of their improvements; and c) Exempt and Vacant parcels received content values worth 0% of their improvements. Property improvements and content values were then totaled, and a 25% loss estimation factor was applied based on those totals, per the FEMA depth damage functions.

There are approximately 2,228 buildings in the 1% annual chance flood zone based on the analysis. The total property exposure (actual building value plus content value estimate) in that flood zone is \$1,417,453,541, with a loss estimate of \$354,363,385. In the 0.2% annual chance flood there are 3,003 buildings, with a total exposure value of \$1,952,814,238 and a loss estimate of \$488,203,559 million additional for that zone. Morrison and Edgewater have the greatest percentage of improved parcels (10% and 14%) at risk of the 0.2% annual flood.

Based on this analysis, the greatest potential losses from 500-year flooding, based on combining the 1% and 0.2% building counts, would occur in Arvada (with roughly total 1,353 buildings) and Wheat Ridge (with 1,441 buildings), unincorporated Jefferson County (with 1,052 buildings), and Lakewood (with 578 buildings). Overall, there are a total of 4,405 parcels at risk or 2% of total improved parcels, with a total value of \$3,370,267,779 million and a loss estimate of \$842,566,945 countywide.

Table 4-38 1% Annual Chance Flood Vulnerability by Jurisdiction

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Estimated Loss	Population
Arvada	631	692	\$206,855,552	\$114,802,322	\$320,406,861	\$80,101,715	1,622
Edgewater	23	33	\$11,012,162	\$5,506,081	\$16,518,243	\$4,129,561	76
Golden	78	124	\$55,642,393	\$38,348,992	\$93,991,385	\$23,497,846	188
Lakewood	212	269	\$183,062,710	\$114,867,152	\$297,929,862	\$74,482,466	338
Morrison	37	60	\$11,257,465	\$9,528,695	\$20,786,160	\$5,196,540	43
Wheat Ridge	333	414	\$107,158,293	\$61,743,602	\$168,901,895	\$42,225,474	772
Unincorporated	561	636	\$289,319,650	\$209,599,486	\$498,919,136	\$124,729,784	1,385
Total	1,875	2,228	\$864,338,225	\$554,396,329	\$1,417,453,541	\$354,363,385	4,424

Source: Wood analysis with Jefferson County Assessor's Data,

Table 4-39 0.2% Annual Chance Flood Vulnerability by Jurisdiction

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Estimated Loss	Population
Arvada	722	804	\$364,374,198	\$281,578,730	\$645,952,928	\$161,488,232	1,696
Edgewater	152	166	\$30,133,979	\$15,979,212	\$46,113,191	\$11,528,298	368
Golden	245	256	\$144,999,142	\$91,462,889	\$236,462,031	\$59,115,508	491
Lakewood	297	309	\$104,593,776	\$58,388,391	\$162,982,167	\$40,745,542	686
Morrison	21	25	\$5,413,965	\$3,025,722	\$8,439,687	\$2,109,922	39
Wheat Ridge	778	1,027	\$287,950,652	\$162,587,474	\$450,538,126	\$112,634,531	2,067
Unincorporated	315	416	\$212,552,121	\$189,773,989	\$402,326,110	\$100,581,527	1,061
Total							

Source: Wood analysis with Jefferson County Assessor's Data

Table 4-40 Improved Properties at Risk of 1% Annual Chance Flood Hazard by Jurisdiction

Jurisdiction	Property Type	Improved Parcels	Building Counts	Improved Value	Content Value	Total Value	Estimated Loss (25%)	% of Total Parcels
Arvada	Commercial	10	20	\$11,938,573	\$11,938,573	\$23,877,146	\$5,969,287	
	Exempt	3	4	\$479,778	\$479,778	\$959,556	\$239,889	
	Industrial	4	5	\$5,550,988	\$8,326,482	\$13,877,470	\$3,469,368	
	Mixed Use	1	9	\$1,760,791	\$479,778	\$959,556	\$239,889	
	Residential	613	654	\$187,155,422	\$93,577,711	\$280,733,133	\$70,183,283	
	Total	631	692	\$206,885,552	\$114,802,322	\$320,406,861	\$80,101,715	2%
Edgewater	Residential	23	33	\$11,012,162	\$5,506,081	\$16,518,243	\$4,129,561	
	Total	23	33	\$11,012,162	\$5,506,081	\$16,518,243	\$4,129,561	2%
Golden	Commercial	16	26	\$10,064,295	\$10,064,295	\$20,128,590	\$5,032,148	
	Exempt	3	3	\$5,775,725	\$5,775,725	\$11,551,450	\$2,887,863	
	Industrial	7	8	\$1,990,530	\$2,985,795	\$4,976,325	\$1,244,081	
	Mixed Use	3	3	\$1,234,510	\$1,234,510	\$2,469,020	\$617,255	
	Residential	49	84	\$36,577,333	\$18,288,667	\$54,866,000	\$13,716,500	
	Total	78	124	\$55,642,393	\$38,348,992	\$93,991,385	\$23,497,846	1%
Lakewood	Commercial	52	85	\$27,573,709	\$27,573,709	\$55,147,418	\$13,786,855	
	Exempt	4	4	\$2,942,409	\$2,942,409	\$5,884,818	\$1,471,205	
	Industrial	13	25	\$7,039,789	\$10,559,684	\$17,599,473	\$4,399,868	
	Mixed Use	5	6	\$2,075,898	\$2,075,898	\$4,151,796	\$1,037,949	
	Residential	138	149	\$143,430,905	\$71,715,453	\$215,146,358	\$53,786,589	
	Total	212	269	\$183,062,710	\$114,867,152	\$297,929,862	\$74,482,466	0.4%
Morrison	Commercial	18	31	\$5,632,583	\$5,632,583	\$11,265,166	\$2,816,292	
	Mixed Use	7	8	\$2,167,342	\$2,167,342	\$4,334,684	\$1,083,671	
	Residential	12	21	\$3,457,540	\$1,728,770	\$5,186,310	\$1,296,578	
	Total	37	60	\$11,257,465	\$9,528,695	\$20,786,160	\$5,196,540	24%
Wheat Ridge	Commercial	8	12	\$2,593,423	\$2,593,423	\$5,186,846	\$1,296,712	
	Exempt	4	6	\$497,426	\$497,426	\$994,852	\$248,713	
	Industrial	11	32	\$6,619,031	\$9,928,547	\$16,547,578	\$4,136,894	
	Residential	310	364	\$97,448,413	\$48,724,207	\$146,172,620	\$36,543,155	

Jurisdiction	Property Type	Improved Parcels	Building Counts	Improved Value	Content Value	Total Value	Estimated Loss (25%)	% of Total Parcels
	Total	333	414	\$107,158,293	\$61,743,602	\$168,901,895	\$42,225,474	3%
Unincorporated	Agriculture	4	4	\$83,279	\$83,279	\$166,558	\$41,640	
	Commercial	49	63	\$110,506,915	\$110,506,915	\$221,013,830	\$55,253,458	
	Exempt	6	7	\$415,435	\$415,435	\$830,870	\$207,718	
	Industrial	9	12	\$8,938,011	\$13,407,017	\$22,345,028	\$5,586,257	
	Mixed Use	6	7	\$997,670	\$997,670	\$1,995,340	\$498,835	
	Residential	487	543	\$168,378,340	\$84,189,170	\$252,567,510	\$63,141,878	
	Total	561	636	\$289,319,650	\$209,599,486	\$498,919,136	\$124,729,784	1%
Grand Total		1,875	2,228	\$864,338,225	\$554,396,329	\$1,417,453,541	\$354,363,385	1%

Source: Wood analysis with Jefferson County Assessor's Data,

Table 4-41 Improved Properties at Risk of 0.2% Annual Chance Flood by Jurisdiction

Jurisdiction	Property Type	Improved Parcels	Building Counts	Improved Value	Content Value	Total Value	Estimated Loss (25%)	% of Total Parcels
Arvada	Agriculture	3	3	\$265,224	\$265,224	\$530,448	\$132,612	
	Commercial	44	63	\$68,906,209	\$68,906,209	\$137,812,418	\$34,453,105	
	Exempt	2	2	\$2,159,510	\$2,159,510	\$4,319,020	\$1,079,755	
	Industrial	35	42	\$54,539,458	\$81,809,187	\$136,348,645	\$34,087,161	
	Mixed Use	6	10	\$18,373,402	\$18,373,402	\$36,746,804	\$9,186,701	
	Residential	632	684	\$220,130,395	\$110,065,198	\$330,195,593	\$82,548,898	
	Total	722	804	\$364,374,198	\$281,578,730	\$645,952,928	\$161,488,232	2%
Edgewater	Commercial	2	2	\$908,775	\$908,775	\$1,817,550	\$454,388	
	Exempt	1	1	\$28,499	\$28,499	\$56,998	\$14,250	
	Mixed Use	1	3	\$887,171	\$887,171	\$1,774,342	\$443,586	
	Residential	148	160	\$28,309,534	\$14,154,767	\$42,464,301	\$10,616,075	
	Total	152	166	\$30,133,979	\$15,979,212	\$46,113,191	\$11,528,298	10%
Golden	Commercial	19	19	\$29,186,056	\$29,186,056	\$58,372,112	\$14,593,028	
	Exempt	2	2	\$4,019,419	\$4,019,419	\$8,038,838	\$2,009,710	
	Industrial	1	1	\$167,454	\$251,181	\$418,635	\$104,659	

Jurisdiction	Property Type	Improved Parcels	Building Counts	Improved Value	Content Value	Total Value	Estimated Loss (25%)	% of Total Parcels
	Mixed Use	15	15	\$4,386,252	\$4,386,252	\$8,772,504	\$2,193,126	
	Residential	208	219	\$107,239,961	\$53,619,981	\$160,859,942	\$40,214,985	
	Total	245	256	\$144,999,142	\$91,462,889	\$236,462,031	\$59,115,508	4%
Lakewood	Commercial	7	7	\$12,183,005	\$12,183,005	\$24,366,010	\$6,091,503	
	Residential	290	302	\$92,410,771	\$46,205,386	\$138,616,157	\$34,654,039	
	Total	297	309	\$104,593,776	\$58,388,391	\$162,982,167	\$40,745,542	1%
Morrison	Commercial	1	3	\$467,746	\$467,746	\$935,492	\$233,873	
	Exempt	2	2	\$139,723	\$139,723	\$279,446	\$69,862	
	Mixed Use	1	1	\$30,010	\$30,010	\$60,020	\$15,005	
	Residential	17	19	\$4,776,486	\$2,388,243	\$7,164,729	\$1,791,182	
	Total	21	25	\$5,413,965	\$3,025,722	\$8,439,687	\$2,109,922	14%
Wheat Ridge	Agriculture	1	1	\$11,380	\$11,380	\$22,760	\$5,690	
	Commercial	30	38	\$29,597,739	\$29,597,739	\$59,195,478	\$14,798,870	
	Exempt	2	2	\$333,766	\$333,766	\$667,532	\$166,883	
	Industrial	4	7	\$3,171,115	\$4,756,673	\$7,927,788	\$1,981,947	
	Mixed Use	4	4	\$939,180	\$939,180	\$1,878,360	\$469,590	
	Residential	737	975	\$253,897,472	\$126,948,736	\$380,846,208	\$95,211,552	
	Total	778	1,027	\$287,950,652	\$162,587,474	\$450,538,126	\$112,634,531	7%
Unincorporated	Commercial	33	48	\$107,855,057	\$107,855,057	\$215,710,114	\$53,927,529	
	Exempt	2	2	\$1,253,533	\$1,253,533	\$2,507,066	\$626,767	
	Industrial	31	110	\$28,252,214	\$42,378,321	\$70,630,535	\$17,657,634	
	Mixed Use	6	7	\$1,382,838	\$1,382,838	\$2,765,676	\$691,419	
	Residential	243	249	\$73,808,479	\$36,904,240	\$110,712,719	\$27,678,180	
	Total	315	416	\$212,552,121	\$189,773,989	\$402,326,110	\$100,581,527	0.4%
Grand Total		2,530	3,003	\$1,150,017,833	\$802,796,405	\$1,952,814,238	\$488,203,559	1%

Source: Wood analysis with Jefferson County Assessor's Data

Based on this analysis, Arvada, Wheat Ridge and unincorporated parts of the County have the most total vulnerable buildings to the 1% annual chance flood (631, 333 and 561 structures, respectively). Additionally, these same jurisdictions have the most total vulnerable buildings to the 0.2% annual chance flood (722, 778 and 315 structures, respectively).

It is also evident that the jurisdictions of Arvada, Lakewood and the unincorporated parts of the county have the highest total dollar exposure to potential losses from the 1% annual chance flood. The analysis shows potential losses for Arvada at \$80M, Lakewood at \$74M and \$124M for the unincorporated County. In the 0.2% annual chance scenario Arvada, Wheat Ridge and the unincorporated County show the greatest losses at \$161M, \$112M and \$100M, respectively.

Not included in the tables above is analysis of locally regulated floodplains and FEMA Zone D, which are mostly in the southern portion of the County where development is limited (Refer to Figure 4-32 and Figure 4-34). Jefferson County regulates areas in Zone D that are within 50 feet of the thalweg (aka deepest part of a stream channel) of a major drainage tributary area of 130 acres or greater. There are 121 buildings with a total value of \$45,451,637 within Golden, Lakewood and unincorporated areas of the county at risk to flooding in this area. A majority (109) are located within unincorporated Jefferson County including 104 residential properties. The follow table shows the results of the analysis using the county's local flood layers.

Table 4-42 Properties within Local Flood Areas (Zone D)

Jurisdiction	Property Type	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Estimated Loss	Population
Golden	Commercial	1	1	\$6,917	\$6,917	\$13,834	\$3,459	
	Total	1	1	\$6,917	\$6,917	\$13,834	\$3,459	
Lakewood	Commercial	1	1	\$299,234	\$299,234	\$598,468	\$149,617	
	Residential	2	2	\$601,432	\$300,716	\$902,148	\$225,537	5
	Total	3	3	\$900,666	\$599,950	\$1,500,616	\$375,154	5
Unincorporated	Commercial	4	4	\$124,899	\$124,899	\$249,798	\$62,450	
	Exempt	1	1	\$34,143	\$34,143	\$68,286	\$17,072	
	Residential	104	112	\$29,371,455	\$14,685,728	\$44,057,183	\$11,014,296	286
	Total	109	117	\$29,530,497	\$14,844,770	\$44,375,267	\$11,093,817	286
Grand Total		113	121	\$30,438,080	\$15,451,637	\$45,889,717	\$11,472,429	290

Source: Jefferson County Floodplain Administrator, Wood Analysis

People

Table 4-40 and Table 4-41 show estimates of population affected by both the 1% annual chance and the 0.2% annual chance flood scenarios. Consistent with the building and value vulnerabilities, Arvada, Wheat Ridge and the unincorporated County are most at-risk, although Wheat Ridge has a far greater number (2,067 persons) potentially vulnerable to the 0.2% annual chance compared to the building and value vulnerabilities. The numbers are based on multiplying the counts of residential structures within the flood hazard areas by the average household size for the County based on data from the State of Colorado Office of Demography.

Critical Facilities and Infrastructure

To estimate the potential impact of floods on critical facilities, a GIS overlay was performed of the flood hazard layer for critical facility point locations Critical facilities at-risk to the 1% annual chance flood are listed in Table 4-43. Critical facilities at-risk to the 0.2% annual chance flood are shown in Table 4-44.

Replacement values were not available with the data thus an estimate of potential monetary loss could not be performed. Impacts to any of these facilities could have wide ranging ramifications, in addition to property damage. As expected, most bridges and other critical facilities are located in the urbanized northeastern part of the county where the majority of the population is located. Nevertheless, the critical

facilities in the southern part of the County are extremely important as failure of one of these could require assistance and emergency services to be brought in from distant locations. Bridges and road infrastructure in Coal Creek Canyon and the canyons of Boulder and Larimer County were severely impacted in the 2013 floods. The bridge maps indicate concentrations of bridges along Highway 74 west of Morrison.

Table 4-43 Critical Facilities in 1% Annual Chance Flood Hazard Areas

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	38
	Microwave Service Towers	7
	Total	45
Energy	Electric Substation	2
	Power Plant	2
	Total	4
Food, Water, Shelter	Wastewater Plant	3
	Water Facility	1
	Total	4
Hazardous Material	RMP Facility	1
	Tier II	6
	Total	7
Safety and Security	Fire Station	2
	Government Facility	2
	Total	4
Transportation	Bridge	138
	Total	138
Grand Total		202

Source: HIFLD and CERC

Table 4-44 Critical Facilities in 0.2% Annual Chance Flood Hazard Areas

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	15
	Paging Transmission	1
	Total	16
Food, Water, Shelter	Water Facility	1
	Total	1
Hazardous Material	Tier II	7
	Total	7
Health and Medical	Nursing Home	2
	Total	2
Safety and Security	EOC	1
	Fire Station	2
	Government Facility	3
	Law Enforcement	2

FEMA Lifeline	Critical Facility Type	Count
	School	2
	Total	10
Transportation	Bridge	45
	Total	45
Grand Total		81

Source: HIFLD and CERC

Bridges

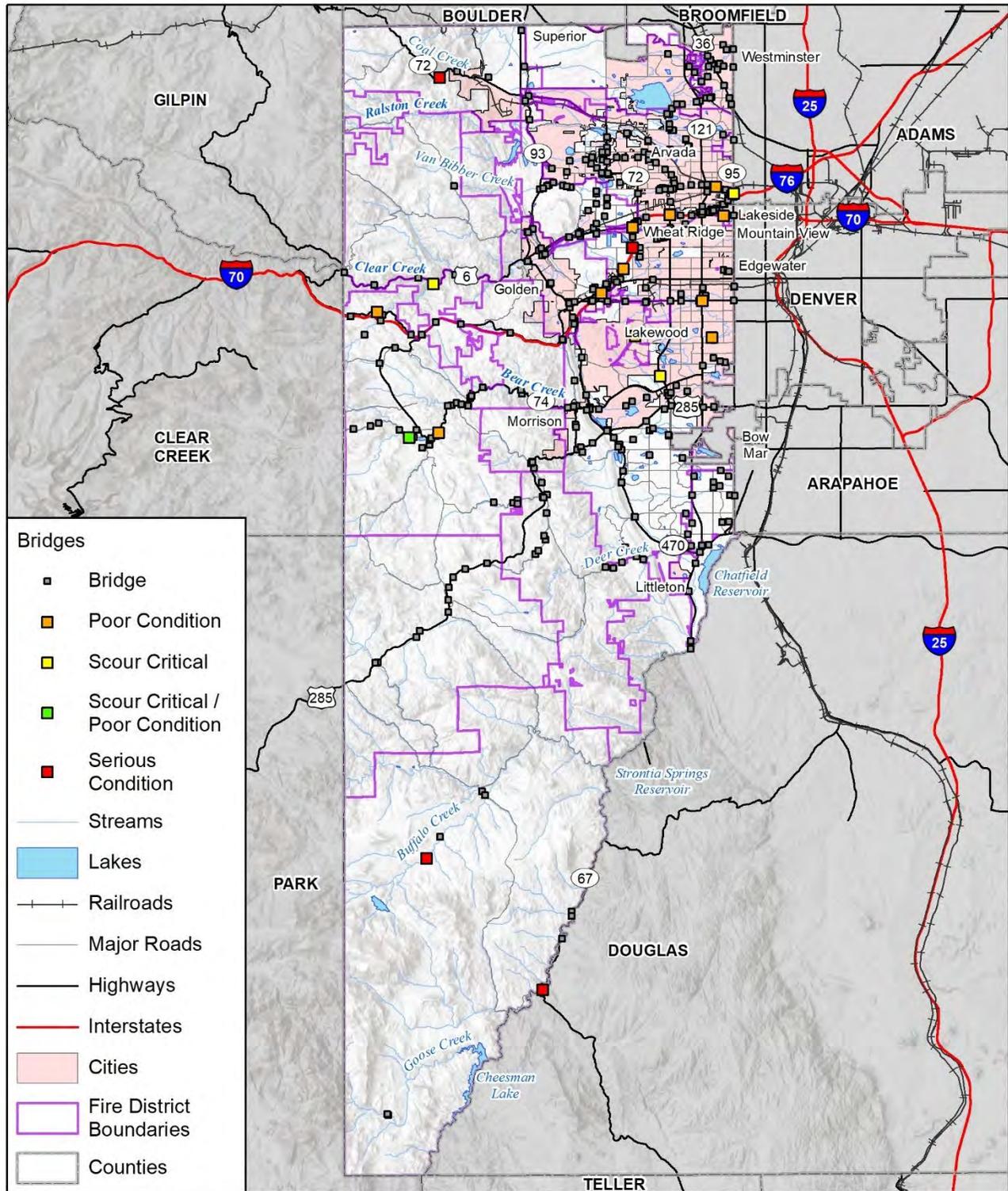
Jefferson County does have a number of bridges of concern, including scour critical (a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition) structurally deficient (when key components like the superstructure are inspected and rated 'poor' or worse by a bridge engineer) and functionally obsolete (when design components are outdated) facilities. Based on a search of the National Bridge inventory there are 9 bridges that fall within these categories, 3 of which are located across Clear Creek. Table 4-45 and Figure 4-37 show the counts and locations for each critical factor listed above.

Table 4-45 Jefferson County Bridges of Concern

Critical Factor	Waterway
Structurally Deficient	Buffalo Creek
Scour Critical/Structurally Deficient	Bear Creek
Scour Critical	Clear Creek
Scour Critical	Clear Creek
Scour Critical	Iliff Gulch
Functionally Obsolete	Coal Creek
Functionally Obsolete	Clear Creek
Functionally Obsolete	I 70 ML
Functionally Obsolete	Bear Creek

Source: National Bridge Inventory

Figure 4-37 Jefferson County Bridges



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
National Inventory of Bridges

0 5 10 Miles



Economy

Flooding can have a major economic impact on the economy, including indirect losses such as business interruption, lost wages, reduced tourism and visitation, and other downtime costs. Flooding often coincides with the summer tourism months and may hence impact, directly or indirectly (such as from the negative perception of potential danger to his hazard), the revenues of tourist agencies, hotel bookings, outdoor activity companies, and other such businesses in the commercial and industrial sectors.

The Colorado Water Conservation Board (CWCB), Future Avoided Cost Explorer (FACE) tool which estimates annual damages from flooding, Jefferson County could potentially experience an average annual loss of \$12 million in total damages and \$20 total damages per person due to flooding under current population and climate scenarios.

Historical, Cultural, and Natural Resources

There are significant historic, cultural, and natural resources and assets located throughout the County (e.g. trails and natural spaces, lakes). Natural areas within the floodplain often benefit from periodic flooding as a naturally recurring phenomenon. These natural areas often reduce flood impacts by allowing absorption and infiltration of floodwaters. Natural resources are generally resistant to flooding except where natural landscapes and soil compositions have been altered for human development or after periods of previous disasters such as drought and fire. Wetlands, for example, exist because of natural flooding incidents. Areas that are no longer wetlands may suffer from oversaturation of water, as will areas that are particularly impacted by drought. Areas which may have recently suffered from wildfire damage may erode because of flooding, which can permanently alter an ecological system.

National Flood Insurance Program/Community Rating System

The National Flood Insurance Program (NFIP) is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses. A jurisdiction’s eligibility to participate is premised on their adoption and enforcement of state and community floodplain management regulations intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Thus, participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. Table 4-46 shows the dates the jurisdictions in Jefferson County joined the NFIP, the date of the most recent FIRM maps, total number of claims since joining and total dollar value of claims. The data shows that the unincorporated parts of the county have the highest dollar value of claims, with Lakewood the highest number of claims.

Table 4-46 NFIP Data, Jefferson County

Jurisdiction	Date Joined	Effective FIRM Date	Number of Claims	Claims Totals
Arvada, City of	6/23/1972	1/15/2021	71	\$66,412
Edgewater, City of	8/15/1989	2/5/2014	27	\$51,637
Golden, City of	5/15/1985	12/20/2019	14	\$48,938
Lakewood, City of	7/21/1972	2/5/2014	157	\$649,522
Morrison, Town of	12/1/1982	2/5/2014	8	\$1,231
Westminster, City of	9/30/1988	12/20/2019	39	\$260,098
Wheat Ridge, City of	5/26/1972	2/5/2014	45	\$97,251
Unincorporated	8/5/1986	1/15/2021	138	\$1,407,172

Source: FEMA Community Information Systems, Accessed: January 2021

Table 4-47 shows the trends of policies in force from 2015 to 2020; with the exception of Golden all jurisdictions in Jefferson County have decreased numbers of policies in force. Reductions in some cases,

notably Arvada, also reflect flood reduction projects that were implemented in recent years (e.g. along Ralston Creek near Independence St) that have reduced the SFHA and the requirement for flood insurance.

Table 4-47 NFIP Policies in Force, 2015 to 2020

Jurisdiction	Policies in Force		Change 2015 to 2020
	2015	2020	
Arvada	484	360	-124
Edgewater	42	35	-7
Golden	93	94	1
Lakewood	412	371	-41
Morrison	12	8	-4
Westminster	121	97	-24
Wheat Ridge	254	222	-32
Unincorporated	597	415	-182

Source: FEMA Community Information Systems, Accessed: January 2021

Table 4-48 shows the same data, in terms of total dollar amounts insured. This analysis shows most jurisdictions in the County have decreased net dollar amounts insured, reflecting reduced flood vulnerability.

Table 4-48 NFIP Insurance in Force, 2015 to 2020 (Non-Adjusted US Dollars)

Jurisdiction	Insurance in Force		Change 2015 to 2020
	2015	2020	
Arvada	\$114,839,400	\$95,962,300	-\$18,877,100
Edgewater	\$8,859,200	\$9,177,800	\$318,600
Golden	\$25,629,000	\$26,368,500	\$739,500
Lakewood	\$113,461,100	\$107,586,600	-\$5,874,500
Morrison	\$2,590,000	\$2,756,300	\$166,300
Westminster	\$33,447,400	\$27,283,700	-\$6,163,700
Wheat Ridge	\$58,590,100	\$55,482,200	-\$3,107,900
Unincorporated	\$150,687,200	\$113,566,400	-\$37,120,800

Source: FEMA Community Information Systems, Accessed: January 2021

The Community Rating System (CRS) was created in 1990 to recognize communities whose floodplain management activities go above and beyond the NFIP's minimum requirements. Under the CRS, if a community implements certain program activities, such as public information, mapping, regulatory, loss reduction, and/or flood preparedness activities, then its residents can qualify for a flood insurance premium rate reduction.

Table 4-49 shows how jurisdictions in Jefferson County have progressed in the CRS system since 2010.

Table 4-49 Jefferson County Jurisdictions, CRS Rating Trends 2010 - 2020

Jurisdiction	CRS Rating			Change in Class 2015 to 2020
	2010	2015	2020	
Arvada	6	5	5	0
Golden	9	7	7	0
Lakewood	6	6	6	0
Morrison	9	9	8	+1
Westminster	6	6	6	0
Wheat Ridge	7	6	5	+1
Unincorporated	9	6	5	+1

Source: FEMA Community Information Systems, Accessed: January 2021

All jurisdictions in Jefferson County maintained status quo or achieved an improved CRS rating since 2015, suggesting progress in the floodplain management and flood mitigation efforts.

A repetitive loss property is one that has received two or more flood insurance claim payments for at least \$1,000 each in any 10-year period since 1978. A repetitive loss property may or may not be currently insured by the NFIP. According to NFIP data from the Colorado Water Conservation Board (CWCB), accessed January 2021, there are a total of 15 repetitive loss buildings and have been 41 total losses in Jefferson County. Of the claims, 31 losses were associated with the City of Lakewood, 5 with unincorporated county and 5 with the City Arvada. In total there have been \$794,936 repetitive loss payments, \$687,717 is related to buildings and \$107,219 are payments for contents. Table 4-50 shows these repetitive loss buildings by occupancy type.

Table 4-50 Repetitive Loss Properties

Community	Building Type (Occupancy)	# of Losses	NFIP Insured (y/n)
Arvada	Single Family	3	Yes
	Single Family	2	No
Evergreen	Other Non-residential	2	No
Lakewood	Other Residential	1	No
	Other Non-residential	2	No
	Other Non-residential	2	No
	Single Family	6	No
	Single Family	4	No
	Single Family	4	No
	Single Family	4	No
	Single Family	3	No
	Single Family	2	No
	Single Family	2	Yes
	Single Family	2	No
Littleton	Single Family	2	No
Total	15	41	

Source: CWCB

Severe repetitive loss properties (SRL) are those for which the program has either made at least four payments for buildings and/or contents of more than \$5,000 or at least two building- only payments that

exceeded the value of the property. As of January 2021, there were no severe repetitive loss (SRL) structures located within Jefferson County.

Future Development

An analysis of the Year Built field in County Assessor’s Office data shows that from 2015 through 2020, 21 new structures have been built in the 1% floodplain and 71 structures were built in the 0.2% floodplain. While not a large number compared to the total structures at risk described above, it does show that new development is continuing in flood prone areas. New development in the 1% floodplain is mitigated per local floodplain regulations. In general development in the 0.2% floodplain is not regulated; based on this trend and the analysis shown in the vulnerability assessment a 0.2% flood, while less likely, has potential to do extensive damage.

Jefferson County’s continued population, housing, and employment growth creates pressure for land use change and the supporting infrastructure improvements. Floodplain management practices implemented through local floodplain management ordinances should mitigate the flood risk to new development in floodplains. Urbanization and increasing impervious surface areas tend to increase both the rate and the volume of stormwater runoff. Thus, the largest issue with future development trends is urbanization and stormwater drainage issues that add to the peak discharge and volume of floodwaters in floodplains.

The Colorado Water Conservation Board (CWCB), Future Avoided Cost Explorer (FACE) provides an in-depth look at the potential economic impacts and expected annual damages from future flood, drought and wildfire events. The tool looks at three different climate scenarios (current climate conditions, 2050 future – moderately warmer climate and 2050 – severely warmer climate) as well as compares current population to low, medium and high growth population scenarios. The following table compares the estimated annual damages for Jefferson County due to drought events for each of the climate and population scenarios.

Table 4-51 Potential Future Economic Losses from Flooding in Jefferson County

Climate Scenarios	Population Scenarios		
	Low Growth (~653,000)	Medium Growth (~695,000)	High Growth (~740,000)
Current Conditions	Total damages: \$12M	Total damages: \$12M	Total damages: \$13M
	Total damages per person: \$20	Total damages per person: \$20	Total damages per person: \$20
Moderate or More Severe Climate	Total damages: \$20M	Total damages: \$20M	Total damages: \$20M
	Total damages per person: \$30	Total damages per person: \$30	Total damages per person: \$30

Source: Colorado Water Conservation Board (CWCB) Future Avoided Cost Explorer: Hazards <https://cwcb.colorado.gov/FACE>

Overall Hazard Significance

Floods in Jefferson County can have a particular impact on the planning area. Widespread flooding is less frequent, but the 2013 flood demonstrated that these events happen. Flash floods and flooding in small pockets of the County happens with regularity. The geographic extent of the hazard is considered **limited**. The probability of future occurrences is considered **likely** and the magnitude/severity for the event of record is **critical**. In addition, the HMPC considers the hazard to have a **high** overall impact rating on the County. This equates to an overall impact rating of **high**.

4.3.10 Hailstorms

Description

Hailstorms are any storm events where hailstones fall. Hail forms when updrafts carry raindrops into extremely cold areas of the atmosphere where the drops freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. The process of falling, thawing, moving up into the updraft and refreezing before falling again may repeat many times, increasing the size of the hailstone. Hailstones are usually less than two-inches in diameter, but have been reported much larger and may fall at speeds of up to 120 mph. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. These events are often associated with thunderstorms that may also cause high winds and tornadoes. Hail causes nearly \$1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the National Weather Service uses to classify thunderstorms as severe. If hail more than 3/4 of an inch is produced in a thunderstorm, it qualifies as severe.

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. The table below indicates the hailstone measurements utilized by the National Weather Service.

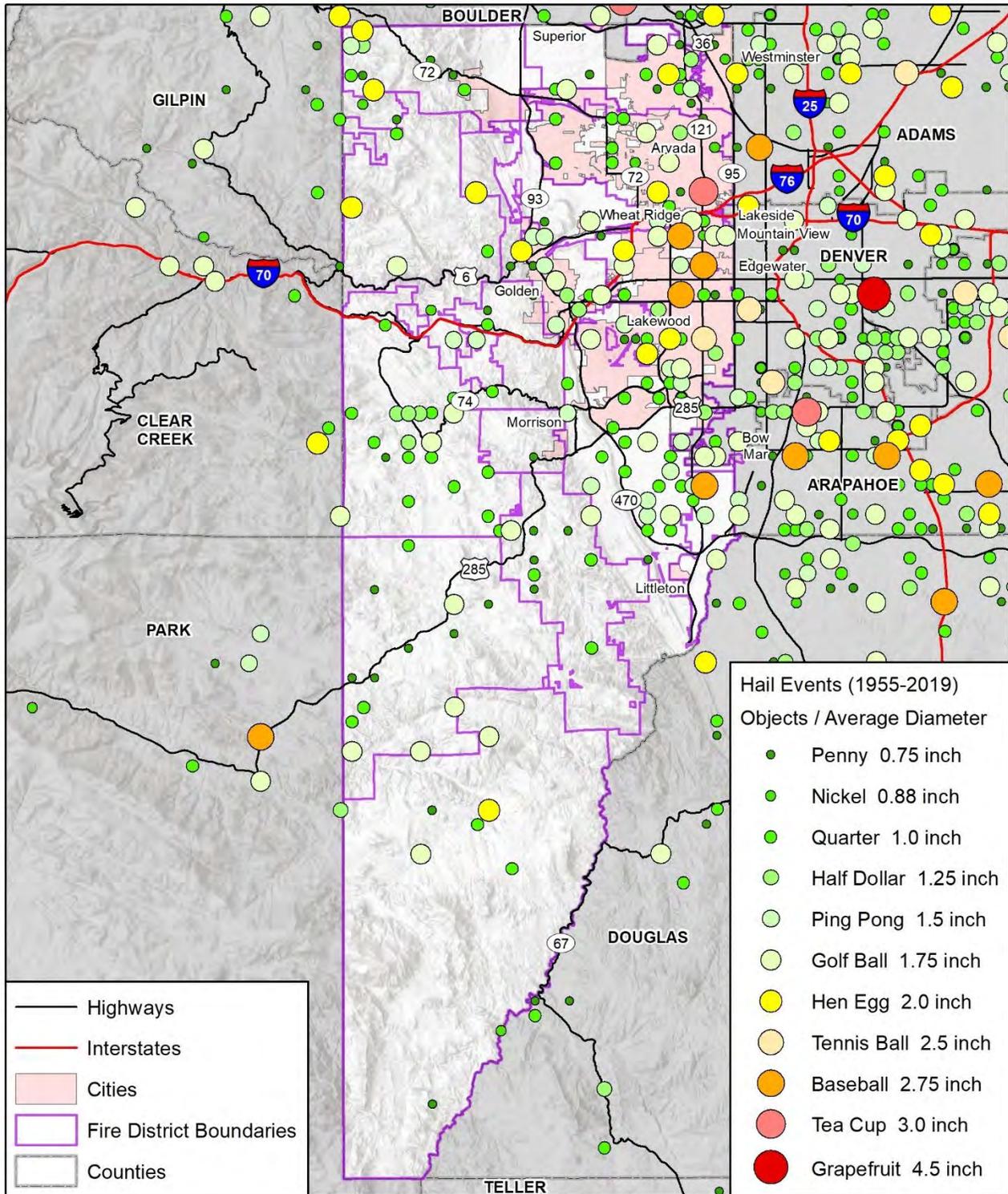
Table 4-52 Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

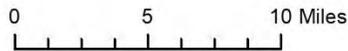
Source: National Weather Service

In Colorado, hail is one of the most damaging of natural hazards. In fact, the 1996 July hailstorm set a record for most damaging hailstorm on a national level at that time. According to the 2018 State Hazard Mitigation Plan, the damaging hail season in Colorado ranges from mid-April to mid-August. Colorado's Front Range, including the entire planning area, is located in the heart of Hail Alley, which receives the highest frequency of large hail in North America and most of the world. According to an April 2020 report from the National Insurance Crime Bureau (NICB), Colorado had the second highest number of insurance claims involving hail from 2017-2019. The Rocky Mountain Insurance Information Association (RMIIA) also reports that hailstorms have caused upwards of \$5 billion over the last 10 years.

Figure 4-38 Jefferson County Hail Events



Map compiled 4/2021; intended for planning purposes only.
Data Source: Jefferson County, CDOT, NOAA, National Weather Services SVRGIS 2019



Geographic Extent

Hailstorms occur during severe storms, which are regional in nature. However, just as the amount of precipitation in the form of snow or rain may vary significantly within a single storm, so may the amount, size, and duration of hail within a severe storm. In general, hail can fall anywhere in Colorado. The areas where hail is most frequently reported with damaging effects are in the eastern plains, where hail damages crops and livestock, and in the Denver metro area, where hailstorms damage buildings, cars and trees, and may cause driving conditions to deteriorate. The extent of impact ranges from limited, where a single community within the planning area is affected, to significant, where more than 50% of the County was impacted. There are no known incidents where a single hailstorm impacted more than 75% of the County; however, so while hail is *possible* anywhere in the planning area, it is not likely to affect the entire area simultaneously. Figure 4-38 below illustrates the location and magnitude of hail events within and adjacent to the planning area from 1955-2019.

Based on this information, the geographic extent rating for hailstorms is **significant**.

Previous Occurrences

Since hailstorms are so prevalent in Colorado, the most useful previous occurrences to examine are those which caused a particularly high amount of damage or incurred some other unique cost or impact. The NCEI database records 422 hail events in the planning area between January 1, 1950 and December 31, 2020. Nineteen of those storms reported hailstones at least two inches in diameter; however, some of these individual storm records reflect the different size hailstones for the same storm event, so the data is somewhat skewed. Several selected incidents, including some not captured in the NCEI database, are profiled below. These selections illustrate the severity of the hail hazard for the jurisdiction and are representative of the range and risk but are not comprehensive.

June 13, 1984 – A mega rain/hailstorm occurred on June 13, 1984. Severe thunderstorms crossed northern Jefferson County and western Adams County dropping 2 to 4" rain and 1" to 3.5" diameter hail. There was serious flooding in Arvada, Westminster, Wheat Ridge and Lakewood. Damage was estimated at \$350-\$400 million (\$723-\$825 million in 2008 dollars) damage in Jefferson County.

July 11, 1990 – A storm with hailstones of up to 2.75" in diameter incurred 13 injuries in the planning area. A companion entry for the same date indicated the hail size was 1.75" but that 47 injuries were reported, which were mostly documented in Elitch Gardens (then located in Denver County). The RMIIA placed the total insured hail damages for the affected area at \$625 million (\$1.03 billion in 2009 dollars). The storm impacted Adams, Arapahoe, Boulder, Denver, Elbert, Jefferson and Larimer counties, with the heaviest damages reported in Jefferson County. Additional accounts indicate that this was the costliest hailstorm in U.S. history, as hail ranged along the entire Front Range. Jefferson County also suffered severe damages to aircraft at the Jefferson County Airport, power and utilities were disrupted to thousands of residents, and storm drains clogged with hail flooded roads three to six feet deep in Arvada.

June 1, 1991 – Intense thunderstorms formed in northern Jefferson County on June 1, 1991. These storms flooded streets and urban streams from Columbine County Club through Lakewood into Golden with 0.75" to 1.5" diameter hail and 1.5" to 3.5" rainfall in less than 1 hour. I didn't have information on the estimated damage for this event.

October 1, 1994 – An afternoon hailstorm, lasting for nearly three hours as it crossed the Denver metro area, produced hail ranging from pea to golf ball sizes. Damages and incidents reported in the planning area include Arvada, Edgewater, and Wheat Ridge. Other impacted areas included Denver, Boulder, Last Chance, Bennett, Strasburg, Wiggins, Penrose, and the Buckley Air National Guard Base near Aurora. Overall insured estimates, sourced by RMIIA, totaled at \$225 million (\$326 million in 2009 dollars).

May 22, 1996 – A severe thunderstorm producing large hail ranging in size from 3/4 to two inches in diameter rumbled across the northwest and northern portions of the Denver metropolitan area. The thunderstorm apparently developed from an outflow boundary generated from the supercell thunderstorm that moved across extreme northeastern Colorado earlier in the evening. The storm developed near the foothills and moved east northeast across northern portions of the metro area. The hardest hit areas were cities of Arvada and Westminster, northwest of Denver. The insurance industry estimated \$60 million in damage to homes and personal property and \$62 million in damage to automobiles for a total of \$122

million in insured losses (\$166.8 million in 2009 dollars). This estimate also included the cities of Golden, Thornton, and Wheat Ridge.

June 8, 2004 – A series of hailstorms stretching along the Front Range from Colorado Springs to Larimer County and out to the eastern border of the state dropped hailstones ranging from dime to golf ball sized. The hail in Jefferson County fell mostly between 7:00 and 8:00 pm across Evergreen and Golden. The next afternoon, Morrison, Conifer, and Lakewood were all impacted by large hailstorms as well. Statewide, insurance damages were reported at \$146.5 million (\$166.4 million in 2009 dollars). This storm was classified as the eighth most costly hailstorm event in Colorado history as of July 2009.

May 24, 2007 – Several fast-moving storms dropped substantial amounts of hail in the foothills southwest of Denver. One hailstorm impacted U.S. Highway 285 near Aspen Park, where state patrol reported two inches of pea-sized hail fell on the highway, causing it to become snow packed and slick. Four associated accidents were reported shortly thereafter, including three roll-overs in a 10-minute period of time. No injuries were reported, and damages were estimated at \$20,000 (\$20,700 in 2009 dollars (most recent data available)).

July 20, 2009 – In an unusual overnight storm, rain, winds and golf-ball sized hail battered roofs, uprooted trees, damaged homes, and pounded vehicles in Wheat Ridge, Lakewood, Arvada and Englewood. Most of the damage in this storm are attributed to property losses, with 32,900 homeowner claims and 19,500 automobile claims filed as of July 27, 2009, which amounts to \$350 million in insurance claims based on preliminary estimates. While the entire Denver metro area was impacted by the storm, the most significant damages were reported in Jefferson County. This storm is projected to be the second costliest natural disaster in Colorado, in terms of insured losses.

May 8, 2017 – A severe afternoon thunderstorm produced what would become the most expensive insured catastrophe in Colorado state history, and the second costliest hailstorm in US history. Hailstones recorded in the event ranged in size from 0.75 inches to 2.75 inches in diameter depending on the location and impacted a large highly populated area of Jefferson County including the cities of Lakewood, Arvada, and Wheat Ridge. According to NCEI, an estimated 150,000 auto insurance claims and 50,000 homeowner insurance claims were filed. The event severely damaged and forced a six month closure of the Colorado Mills Mall in Lakewood, resulting in an estimated monthly loss of \$350,000 in lost sales tax revenue in addition to lost business revenue. The total damage cost of the event totaled around \$2.3 billion.

Probability of Future Occurrences

The record of previous occurrences, as discussed earlier, is incomplete as well, but provides a useful reference for hailstorms which produced significant size stones and/or caused damage. Calculating that Jefferson County experiences six hail events per year is less useful than determining how frequently the planning area may experience a severe event. According to RMIIA, there have been eight severe hailstorms which caused more than \$100 million in damages that impacted Jefferson County in some way since 1990. Since the last plan update, the NCEI records have been updated to include the 2017 event and an event in Columbine that caused over \$350 million in damage to property. This data will be used to determine the probability of a severe hailstorm in Jefferson County.

There have been 87 severe incidents, defined as hailstones 1 inch or greater in diameter in the 2018 Colorado State Hazard Mitigation Plan, involving Jefferson County since 1990. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a severe hailstorm occurring in any given year is 290%. If the same methodology is applied to all hailstorms (including those that cause minimal damage), then there have been 422 events since 1950, for a span of 70 years. This indicates that Jefferson County can expect an average of 6 hailstorms per year.

This corresponds to a probability of future occurrences rating of **highly likely**.

Magnitude and Severity

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a

reflection of common occurrence. The event of record for Jefferson County occurred on May 8, 2017. According to the RMIAA, the event caused \$2.3 billion in damages to property in the jurisdiction. This storm was the costliest in Colorado history and the second costliest storm in US history.

Also of note are the July 20, 2009 and July 11, 1990 hail events. The former of these events resulted in \$767.6 million in insured damages according to the RMIAA. The latter resulted in 60 direct injuries in the duration of the event, and damages inflicted on critical facilities and services (critical infrastructure) resulted in a loss or disruption of services for a minimal amount of time. Documented injuries were considered critical, though the medical response of the jurisdiction was considered minimally impacted.

According to the RMIAA, eight of the top ten hazard events in Colorado by the amount of insured loss were either entirely hail-related or involved hail as a hazard. RMIAA also ranks Colorado 2nd in the U.S. for hail insurance claims.

Based on these factors, the magnitude severity rating for hailstorms is considered **critical**.

Climate Change Considerations

According to the 2018 Colorado State Hazard Mitigation Plan, the future impacts of climate change are expected to influence future hail events. Ongoing efforts to reduce Colorado's greenhouse gas emissions and adapt to a changing climate, such as the Colorado Climate Plan and the Climate Change in Colorado Report, will help to reduce the impacts of climate induced hazard such as hail.

Vulnerability Assessment

All assets located in Jefferson County can be considered at risk from severe hail events. This includes 100% of the County's population, and all buildings and infrastructure within the County.

General Property

Research into the damages inflicted by this hazard indicates the hazard has a high impact on the entire planning area, and perhaps the greatest economic impacts. Hail impacts anything exposed to the event, including structures, infrastructure, landscaping, personal property and vehicles, people, agriculture, and livestock. Jefferson County has the highest number of reported injuries due to hail in the state. Hail is also the costliest insured-losses natural disaster to impact the state of Colorado, with nine separate incidents falling within the top ten disasters list for the state. Existing development remains exposed to hail with minimal mitigation opportunities. Individuals can mitigate exposure by remaining indoors and away from windows during hailstorm events. Vehicles can be parked under shelters to help minimize damage costs incurred in that arena. However, in many cases it is impossible to move existing development away from the impact areas. For example, hail heavily impacts the economic contributors who house merchandize outdoors, such as car retailers, home improvement stores and gardening stores. Damage to landscape and agriculture is also almost impossible to prevent, as the plants cannot be transported indoors for the storm.

People

Exposure is the greatest danger to people from hail, for those caught outside in the open without shelter. Large hail has the potential to cause significant bruising, concussions, the potential for broken bones, and even death. The impacts of hail on vulnerable populations can be more severe. Low income families are more likely to live in poorly constructed homes that are more likely to be damaged, and are more likely to be uninsured or underinsured, making it more difficult for them to recover from hail events. Individuals with disabilities may need more assistance after a major event, especially if transportation or utility services are disrupted. Severe weather warnings must use methods that reach vision or hearing-impaired people and those with limited English proficiency.

Critical Facilities and Infrastructure

Hail can lead to the temporary incapacitation of roads when small hail stones build up so deep, they block roads. Hail has also been observed to block storm drains and prevent proper runoff, potentially resulting in flooding as a secondary hazard. Most structures, including the County's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Economy

The economic impact from hail can be severe on impacted areas, and potentially long lasting. As mentioned throughout this section, hail is the costliest hazard experienced in the planning area. Direct damages have totaled \$5 billion over the last 10 years (averaging to \$500,000,000 per year), but severe indirect economic impacts can also be felt through businesses forced to close for repairs. For example, the 2017 event led to the city of Lakewood losing an estimated \$350,000 in monthly sales tax revenue due to a several month closure of the Colorado Mills mall. Impacts such as these can result in lost revenue and employment, adding to the impact of direct damage costs. Insurance helps to offset some, but not all, of these losses.

Historical, Cultural, and Natural Resources

While hail is a natural environmental process, it can cause significant environmental damage, breaking tree limbs, damaging trees and other plants in bloom, and destroying crops. Some cultural and historic properties may also potentially be at risk of damage from hail.

Future Development

Consideration for future development may include the use of resilient landscaping or the construction of covered parking to minimize those losses. The increased availability of accurate, real-time weather forecasting and alerts the most some protection to both residents and visitors. In some cases, the costs of future mitigation efforts, even in new future development, may outweigh the potential insurance losses; for example, Jefferson County does not generally consider shelters a cost effective mitigation effort in built environments.

Overall Hazard Significance

Hailstorms in Jefferson County have a significant impact on the planning area. The costs of hailstorms are higher than any other natural disaster currently documented for the planning area. In addition, Jefferson County reports the highest number of hail-related injuries in the state at 60. The geographic extent of the hazard is considered **significant**. The probability of future occurrences is considered **highly likely** and the magnitude/severity for the event of record is **critical**. The HMPC considers the hazard to have an overall impact rating of low on the County. The data indicates, however, that an overall impact rating of **high** is most appropriate.

While hailstorms are not as high profile as other natural disasters such as tornadoes, blizzards, or floods, the amount of damage they inflict on the planning area is hugely significant. The hazard is frequent enough in occurrence to pose a significant financial risk to the planning area, and though mitigation measures are limited, the hazard deserves due consideration in the overall profile effort.

4.3.11 Landslides, Debris Flows, and Rockfalls

Description

Landslide

Landslides are a serious geologic hazard common to almost every state in the United States. It is estimated that nationally they cause up to \$2 billion in damages and from 25 to 50 deaths annually. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Gravity is the force driving landslide movement. Factors that allow the force of gravity to overcome the resistance of earth material to landslide include saturation by water, erosion or construction, alternate freezing or thawing, earthquake shaking, and volcanic eruptions.

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Generally significant landslides follow periods of above-average precipitation over an extended period, followed by several days of intense rainfall. It is on these days of intense rainfall that slides are most likely.

Areas that are generally prone to landslide hazards include existing old landslides; the bases of steep slopes; the bases of drainage channels; and developed hillsides where leach-field septic systems are used. The most vulnerable areas are the mountain corridors and the urbanized areas along the Rocky Mountain Front Range. Landslides are often a secondary hazard related to other natural disasters. Landslide triggering rainstorms often produce damaging floods. Earthquakes often induce landslides that can cause additional damage.

Slope failures typically damage or destroy portions of roads and railroads, sewer and water lines, homes and public buildings, and other utility lines. Even small-scale landslides are expensive due to clean up costs that may include debris clearance from streets, drains, streams and reservoirs; new or renewed support for road and rail embankments and slopes; minor vehicle and building damage; personal injury; and livestock, timber, crop and fencing losses and damaged utility systems.

The identification of areas susceptible to landslides is necessary to support grading, building, foundation design, housing density, and other land development regulations in reducing the risk of property damage and personal injury. Some work has been done to prevent development on top of or below slopes subject to sliding. More needs to be done to educate the public and to prevent development in vulnerable areas. Jefferson County has developed a dipping bedrock overlay zone that is designed to mitigate development in these areas that could be damaged by landslides (FEMA, Colorado Geological Survey).

Debris Flow

Debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, are common types of fast-moving landslides. They are a combination of fast-moving water and a great volume of sediment and debris that surges down slope with tremendous force. These flows generally occur during periods of intense rainfall or rapid snowmelt and may occur with little onset warning, similar to a flash flood. They usually start on steep hillsides as shallow landslides that liquefy and accelerate to speeds that are typically about 10 miles per hour but can exceed 35 miles per hour. The consistency of debris flow ranges from watery mud to thick, rocky mud that can carry large items such as boulders, trees, and cars. Debris flows from many different sources can combine in channels, and their destructive power may be greatly increased. When the flows reach flatter ground, the debris spreads over a broad area, sometimes accumulating in thick deposits that can wreak havoc in developed areas. Mudflows are covered under the National Flood Insurance Program; however, landslides are not. Figure 4-39 gives a description of debris flows, characteristics, and provides a picture of the leading edge of a debris flow.

Figure 4-39 Field Evidence of Debris Flow

Deposit Margins/Surfaces

- No dunes or ripples on surface
- Lobate margins
- Accumulations of coarse clasts at margins (sometimes openwork where matrix washed away); otherwise coarse clast distribution on surface is fairly random
- Positive relief (convex surface morphology where flow "freezing" occurs); otherwise surfaces flat, commonly studded with boulders
- Flow levees common but not always formed
- Consolidated sediments packed into "nooks and crannies" – e.g., between roots in root wads, in cavities in trees, buildings, stream banks, etc.
- Commonly dammed locally by small log jams or boulder clusters
- Fragile clasts may be present on surface (e.g., soil clasts, glass bottles)
- Sandy mud coatings on boulders, logs, banks
- No gravel imbrication



Source: USGS publication "Distinguishing between Debris Flows and Floods from Field Evidence in Small Watersheds"

A drainage may have several debris flows a year, or none for several years or decades. They are common events in the steep terrain of Colorado and vary widely in size and destructiveness. Cloudbursts provide the usual source of water for a debris flow in Colorado.

Debris flows ruin substantial improvements with the force of the flow itself and the burying or erosion of them by mud and debris. The heavy mass pushes in walls, removes buildings from foundations, fills in basements and excavations and sweeps away cars, trucks heavy equipment and other substantial objects. Boulders and trees swept along by the muddy mass demolish buildings and flatten fences and utility poles. In mountain areas, portions of valleys have been eroded to a depth of several feet by the flow process.

Removal of vegetation on steep slopes, dumping debris and fill in a mud flow path, and improper road building or earth moving can contribute to a debris flow. The failure of a dam, irrigation ditch or other water management structure can initiate debris flows if the escaping water can swiftly accumulate a large volume of soil materials. Similarly, a landslide that temporarily blocks a stream may cause or contribute to a debris flow.

Rockfall

Rockfalls are the fastest type of landslide and occur most frequently in mountains or other steep areas during early spring when there is abundant moisture and repeated freezing and thawing. The rocks may freefall or carom down in an erratic sequence of tumbling, rolling, and sliding. When a large number of rocks plummet downward at high velocity, it is called a rock avalanche.

Rockfall can be a continuous process over a considerable period of time or a single or series of single, intermittent events. Simultaneous activation of a large mass of rock can result in a rockfall avalanche or very rapid down slope and spreading movement of a large quantity of rock material.

Rockfalls are caused by the loss of support from underneath or detachment from a larger rock mass. Ice wedging, root growth, or ground shaking, as well as a loss of support through erosion or chemical weathering may start the fall.

Rockfalls can demolish structures and kill people. Rocks falling on highways may strike vehicles, block traffic, cause accidents, and sometimes damage the road. Minor but costly consequences are the work of

clearing highways and borrow ditches in rockfall areas. Any structure in the path of a large rockfall is subject to damage or destruction.

Geographic Extent

This hazard is most prevalent in the foothills of western Jefferson County, particularly in the canyons that dissect the region, most of which have County roads or State highways running through them, and some residential development.

US Highway 6 in Clear Creek Canyon is prone to rockfall hazards. North and South Table Mountain in Golden can also produce rockfalls from the namesake basalt cliffs that formed them. The base of the foothills in Golden on the northwest side of the intersection of highways 6 and 93 has also been prone to landslides. This landslide sits directly on top of the Golden Fault. Homes were developed just to the north of this landslide area shortly after the landslide was mitigated. The north side of Green Mountain in Lakewood has also had landslide problems.

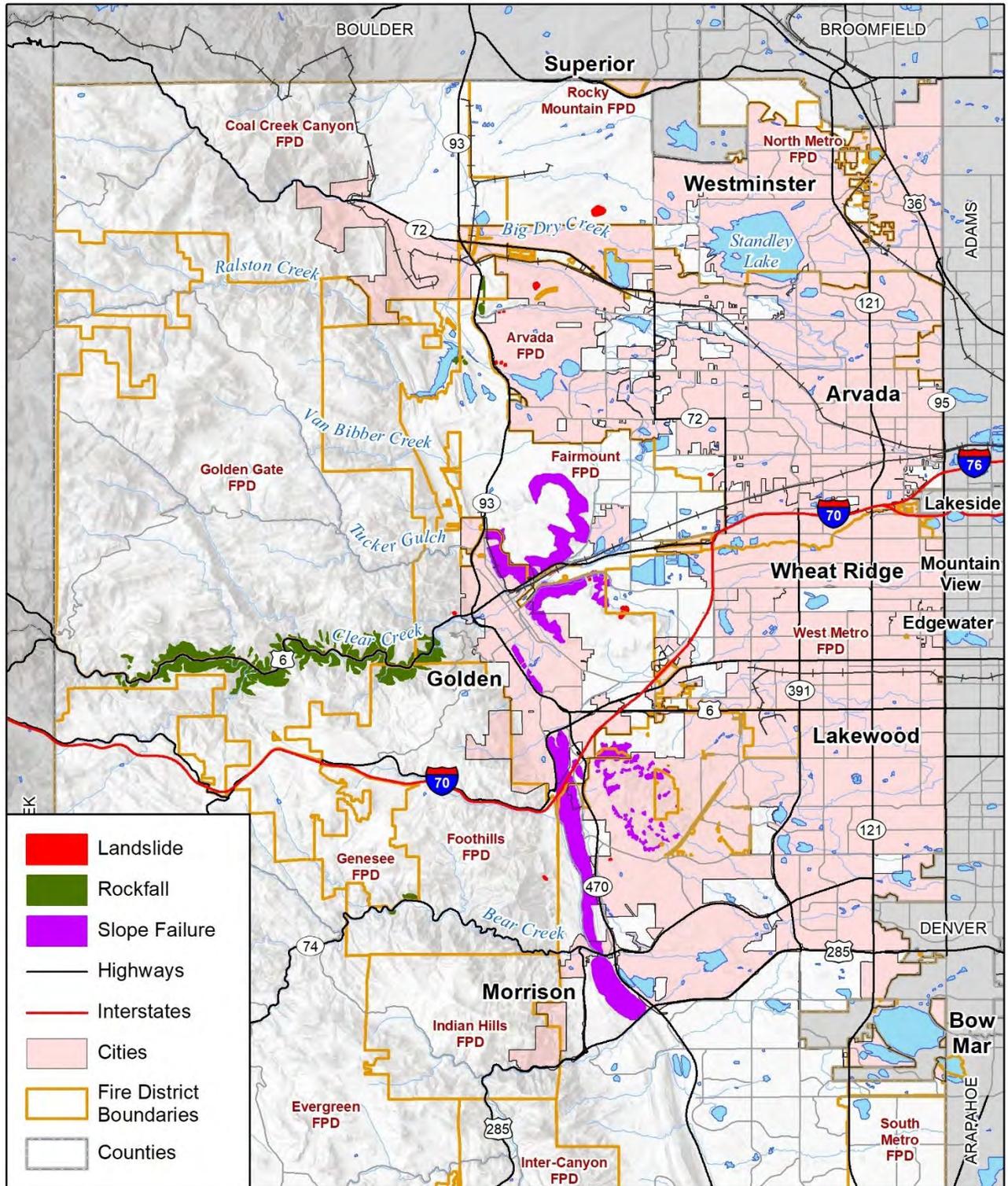
The Colorado Landslide Hazard Mitigation Plan, developed in 1988 and updated in 2002, identified 49 areas in Colorado where landslides could have the "most serious or immediate potential impact on communities, transportation corridors, lifelines, or the economy." A Year 2002 Review and Priority List was done as part of an update of the 1988 Colorado Landslide Mitigation Plan. The update is a status report on 49 locations believed to pose the most serious landslide risk in Colorado that were identified in the 1988 plan. The hazard areas (landslide/rockfall or debris flow) are categorized into three tiers. Tier One listings are serious cases needing immediate or ongoing action or attention because of the severity of potential impacts. Tier Two listings are very significant but less severe; or where adequate information and/or some mitigation is in 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.

Rockfall areas along US HWY 6 in Clear Creek Canyon are considered Tier One rockfall areas. This area is considered a state priority due to the increased traffic and vulnerability of the traveling public to the gambling destinations of Blackhawk and Central City.

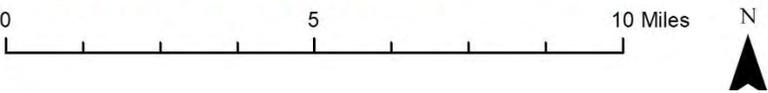
Two areas were identified as Tier One debris flow areas including the foothills of Jefferson County burned by the Hi Meadows wildfire in 2000 and the Schoonover wildfire in 2002. In addition, the burn area of the Hayman Fire must be considered a particularly vulnerable area. These wildfires leave the potential for debris flows, rockfalls, and extreme erosion in the area around the fire. Minor landslides will likely continue in susceptible areas because of post-fire conditions or when heavy precipitation occurs.

Two Tier Three landslide areas are identified: Golden to Boulder along CO Hwy 93 and the Morrison Town water plant. The report noted that impacts to Hwy 93 have lessened with roadway improvements and sound engineering practices. The Morrison Town water plant landslide has been mitigated but it is recommended that good drainage be maintained, and that no construction or expansion of the facility be done without thorough geological evaluation and engineering design.

Figure 4-40 Landslide, Rockfall, and Slope Failure Hazards in Jefferson County



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT



As demonstrated in Figure 4-40, a minimal portion of the planning area is prone to occurrences of landslide and rockfall hazards, and of that, only areas with development (such as highways, roads, and subdivisions) are particularly vulnerable to the direct impacts. It should be noted, however, that when this hazard causes road closures, the overall area affected indirectly can be much larger than the slide area itself, with impacts extending into multiple counties on both ends of the incident.

Based on this information, the geographic extent rating for landslide, debris flow, and rockfall is considered **limited**.

Previous Occurrences

Since landslides, debris flows, and rockfalls have a high level of prevalence in Colorado, and a moderate level of prevalence in Jefferson County, the most useful previous occurrences to examine are those which caused a particular high amount of damage or incurred some other cost or impact. Several selected incidents are profiled below. There is no public database or information clearinghouse for this hazard. Information regarding these incidents was sourced from multiple sources. This is not an exhaustive list, but it does illustrate the severity of impacts that landslides, debris flows, and rockfalls exert on Jefferson County.

March 1974 – A boulder the size of a small car hurtled down the steep west side of the hogbacks in Jefferson County. It bounced into a new subdivision and stopped after penetrating a wall in the back of an expensive home. No one was injured. Property damage was about \$10,000, including the cost of measures to prevent similar incidents at that site in the immediate future. The incident could have been prevented easily in the subdivision development stage, but it was not recognized.

1985 – A landslide directly upslope from the Morrison's water treatment plant became active in the spring of 1985. The problem was mitigated by removing most of the landslide-prone material and has not had problems since (CO Landslide Mitigation Plan 2002 update).

1993-1994 – The Highway 93 Golden bypass at the base of the foothills in Golden on the northwest side of the intersection of Highways 6 and 93 was affected by a landslide shortly after its construction. CDOT spent \$3 million in 1994 to mitigate the problem.

August 31, 1997 – Rock and debris were deposited on the southbound lanes of Highway 285 at the base of the south and north flanks of the slide. Two cars on highway 285 were damaged due to the slide; one drove into rocks and debris on the highway and a second then ran into the first. North and south bound lanes of Highway 285, a major commuter route to and from Denver, were closed and traffic was diverted through Tiny Town along Turkey Creek Road. The southbound lane was closed for over one month. Movement was believed to have been triggered by the cumulative effect of above average rainfall in August.

1998 – Renewed movement of an older landslide deposit on the north side of Green Mountain resulted in three homes being damaged beyond repair and two other homes severely damaged. Earth anchors and drainage improvements have been installed to mitigate future movement.

2000 – On U.S. 6 in Clear Creek Canyon, a vehicle crashed into a 2-ton rock on the highway. There were no serious injuries reported. In a separate incident, a motorist was injured when a basketball sized rock crashed through the windshield and hit him in leg.

2003 – Heavy rains in June of 2003 resulted in flash floods that moved substantial amounts of sediment, causing road obstructions, flooding, and extreme siltation of the South Platte River near Deckers, Colorado. This was a result of the burned out area caused by the Schoonover fire in 2002.

2005 – On U.S. 6 in Clear Creek Canyon 1,400 tons of rock fell during a rockfall. Two truck drivers and a motorist escaped injury. One boulder was measured to be the size of a minivan.

2006 – On U.S. 6 in Clear Creek Canyon, a car (unoccupied at the time) was flattened under a slab of rock.

2006 – In West Creek and Deckers, there were boulders and debris flows during rainstorms over areas previously affected by a wildfire burn.

2007 – On US 6, a rock crashed through the roof of an SUV. The driver of the SUV sustained minor injuries. The rock was measured and reported to be the size of a beach ball.

July 21, 2009 – Highway 126 north of Deckers near Cheesman Reservoir was washed out due to a severe rainstorm, placing trees and debris on the road. Jefferson County closed the highway down to Deckers. No one was killed or injured. The road was severely undercut and washed away in several places. Jefferson County Road and Bridge performed maintenance on the area periodically for two to three weeks to repair the damage done to the roadway.

September 2013 – Rainfall on September 9-13th triggered at least 1,138 debris flows along the Colorado Front Range. According to the HMPC there were debris flows blocking US 6 in Clear Creek Canyon, Golden Gate Canyon, Coal Creek Canyon, and Upper Bear Creek above Evergreen Dam all at the same time on September 12th.

February 24, 2015 – US 6 was closed in both directions between Golden and Colorado 119 as a number of rocks slid off Clear Creek Canyon approximately 6 miles west of Golden. One car was severely damaged; a passenger in the car was transported to the hospital in good condition.

2020 – Landslide in Leyden Rock in an open space area in Arvada (City of Arvada 2020).

Probability of Future Occurrences

Mitigation efforts have been taken to decrease probability of future occurrences. A rockfall mitigation project has been underway in Bear Creek Canyon between Idledale and Morrison since September 2020. The mitigation project will enhance safety for motorists and cyclists along Highway 74 with a goal of preventing roadway damage or unexpected closures due to a landslide or rockfall (CDOT 2020).

Based on the history of landslides, debris flow incidents, and rockfalls in Jefferson County (15 incidents over 46 years events) since 1974 a damaging event occurs on average every three years. Rockfalls in the canyons typically occur annually and usually in the winter and spring during freeze-thaw cycles. Since the hazards are profiled together due to common onset and impacts, the probability of future occurrence is established collectively. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a landslide-type event occurring in any given year is 33%. This corresponds to a probability of future occurrences rating of **likely**.

Magnitude and Severity

The overall magnitude and severity rating is a reflection of the common occurrence of this hazard. Property damages from these hazards has been in the millions of dollars, but generally limited in extent and periodic, typically during wet cycles. The damages inflicted on critical facilities and services (critical infrastructure) are primarily highways in the planning region. This has resulted in a loss or disruption of services periodically in the Clear Creek Canyon HWY 6 corridor. By a combination of mitigation efforts and luck there has not been documented deaths from rockfall in Clear Creek Canyon, but the potential remains. Based on these factors, the magnitude severity ratings for landslide, debris flow, and rockfall are considered **limited**.

Climate Change Considerations

Increased temperatures are projected to contribute to more water evaporation making drought more common, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. Wildfires and earthquakes destabilize soil on steep slopes increasing landslide and debris flow risk. Erosion caused by development on steep hillsides increases risk of landslides. Since the 1950s, snow precipitation and duration of snowpack have both decreased while rising temperatures have increase rate of water evaporating into the air, creating drier soil conditions in Colorado (EPA 2016).

Vulnerability Assessment

Research in the hazard profile for landslide, debris flow, and rockfall events revealed sporadic impacts, particularly in the canyons that dissect the region, most of which have County roads or State highways running through them, and repetitive debris flow issues in areas that have had recent wildfire burns. Future property losses to existing developments would likely be minor, based on patterns of previous events, and impact mostly infrastructure.

General Property

GIS was used to create a risk assessment for geological hazards in Jefferson County. Landslide, rockfall, slope failure and subsidence hazard data were overlaid on Jefferson County parcel and assessor's data.

For the purposes of this analysis, an address point layer in GIS was used to approximate the center of buildings. Geologic hazard data was then overlaid on the address points. For the purposes of this analysis, the hazard zone that intersected an address point was assigned the hazard for the entire parcel. The model assumes that every parcel with a structure value greater than zero is improved in some way. Specifically, an improved parcel assumes there is a building.

These counts are listed in Table 4-53. Critical facilities at risk to slope failure are listed in Table 4-54. The model did not identify any buildings at risk to rockfall hazards.

These tables show the value of developed parcels identified as being exposed to the landslide or slope failure hazard. No parcels were exposed to the rockfall hazard. Results are sorted by occupancy type and by jurisdiction to demonstrate how the hazard's risk varies across the planning area. Maps that display the parcels affected by these hazards can be referenced in the applicable jurisdictional annexes. Overall, the total value exposed to landslide or slope failure increased from approximately \$354 million in 2016 to nearly \$427 million in 2020. The jurisdiction with the greatest exposure to landslide or slope failure is Golden with nearly \$349 million of total value exposed. A more site-specific analysis would need to be done to further determine if exposure equates to vulnerability, as this analysis does not take into account mitigation or strategic building siting that might have occurred during development.

Table 4-53 Building Exposure to Landslides or Slope Failure

Jurisdiction	Property Type	Improved Parcels	Building Counts	Total Value	Population
Golden	Exempt	1	1	\$95,600	
	Industrial	1	1	\$1,289,075	
	Mixed Use	1	2	\$103,992,458	
	Residential	292	292	\$243,596,070	654
	Total	295	296	\$348,973,203	654
Lakewood	Exempt	1	1	\$95,600	
	Industrial	1	1	\$176,850	
	Residential	16	16	\$8,135,145	36
	Total	18	18	\$8,407,595	36
Morrison	Exempt	1	1	\$50,528	
	Mixed Use	3	3	\$1,039,080	
	Residential	4	4	\$1,086,720	8
	Total	8	8	\$2,176,328	8
Unincorporated	Commercial	4	5	\$14,402,494	
	Exempt	1	1	\$88,334	
	Residential	60	60	\$52,631,627	153
	Total	65	66	\$67,122,455	153
Grand Total		386	388	\$426,679,581	852

Source: Based on analysis of Jefferson County GIS and Assessor's Data

People

Past landslides in Jefferson County have not caused loss of life or major injuries to date, although the potential for both exists. As shown in Table 4-53, 852 people live in areas at risk of landslide or slope failure. Exposure is the greatest danger to people in remote locations in areas of steep slopes and higher precipitation areas in the western to central portion of the county. People who travel along these

roadways or highways that are susceptible to landslides and rockslides are also exposed. Landslides have closed down highways for hours to days, which can affect essential services for rural populations. As population, tourism, and development increases in landslide prone areas, landslide occurrence interacting with people and development will also increase.

Critical Facilities and Infrastructure

Critical facilities exposed to landslides or slope failure increased from three in Golden in 2016 to six in 2020. And the unincorporated jurisdiction now has four critical facilities exposed.

Table 4-54 Critical Facilities At-Risk to Landslides or Slope Failure

Jurisdiction	FEMA Lifeline	Critical Facility Type	Count
Golden	Communications	Microwave Service Towers	3
	Hazardous Material	Household Hazardous Waste	1
	Safety and Security	Government Facility	2
Unincorporated	Communications	Land Mobile Private Towers	3
	Hazardous Material	Tier II	1

Source: HIFLD and CERC

Economy

Rockfall impacts on Jefferson County foothill highways and County roads have the potential to cause significant indirect economic loss. The most significant road that could be impacted by rockfall and related road closures is Highway 6 in Jefferson County in Clear Creek Canyon. Economic losses from this road closure and resulting detours could be estimated with traffic counts and detour mileage.

Historical, Cultural, and Natural Resources

Landslides/rockslides are a natural environmental process. Environmental impacts include the removal of vegetation, soil, and rock.

Future Development

Steep slope regulations limit problems from these hazards for future development, thus the exposure of infrastructure to these hazards is not anticipated to grow. As expansion of the gambling communities grows in nearby Gilpin County, the amount of traffic along the Clear Creek Canyon Highway 6 corridor will increase, and thus the amount of people exposed to danger from rockfall hazards may increase. While mitigation projects are in place to reduce dangers to drivers from falling rock along this corridor, more may be necessary in the future.

Overall Hazard Significance

Landslides, debris flow, and rockfall in Jefferson County periodically impact on the planning area. The geographic extent of the hazard is considered **limited**. The probability of future occurrences is considered **likely** and the magnitude/severity for the event of record is **limited**. This equates to an overall impact rating of **medium**. While landslides, debris flow, and rockfall do occur with some regularity in Jefferson County, the direct effect on the populace is low, but the potential for severe injury or death remains from rockfall. Singular individuals or small groups may be affected by the direct effects of landslides, debris flow, and rockfall. The secondary effect of closed roads is a greater threat to the larger populace, especially if the closed roads cut off emergency personnel from those who need assistance.

4.3.12 Lightning

Description

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds. Typically, thunderstorms include rain, hail, or other forms of precipitation. However, it is possible for a thunderstorm to produce lightning with no delivery of precipitation. These events are called 'dry thunderstorms.'

Intra-cloud 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, similar to a cloud-to-ground flash, can be visible for many miles.

Cloud-to-ground lightning is the most damaging and dangerous form of lightning, though it is less common than intra-cloud occurrences. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, some 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, and can strike as far as 5 or 10 miles from the storm and occur in areas where common observers may not recognize the danger. Positive lightning also has a longer duration, so fires are more easily ignited. Positive lightning strikes usually carry a high peak electrical current, which may potentially result in greater damage.

The ratio of cloud-to-ground and intra-cloud lightning varies significantly between storms. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge either stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 22 million strokes of lightning from the cloud-to-ground every year.

According to the Colorado Division of Homeland Security and Emergency Management, lightning is the number one life threatening weather hazard. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires, and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 24,600 fires in the United States each year. The Institute estimates annual damages from lightning to be approximately \$4-5 billion in the US. Lightning is so significant in Colorado that the Governor declares an annual Lightning and Wildfire Awareness Week each summer. According to NOAA, Colorado ranks 5th out of all states in total lightning caused fatalities from 1959 to 2016. Additionally, NOAA ranks Colorado 19th in the nation in the number of cloud-to-ground lightning flashes and 32nd in the nation in overall flash density with 4.8 flashes per square kilometer.

Previous Occurrences

There are approximately 2,000 thunderstorms occurring globally at any one time, with 75-100 cloud-to-ground lightning strikes per second. The NCEI storm events database lists 33 significant lightning strike events since 1995 in Jefferson County. Impacts of these strikes generally can be drawn into two categories:

- Strikes that are notable because of human injury or fatality (7 strikes). These primarily occur when the victim is unsheltered during a lightning storm.
- Strikes that are notable because of property damage (12 strikes). Most damages occurred to single properties.

The selections below demonstrate some events which caused notable injury, death, or property damage, and those events which triggered wildfires. (See Section 4.3.17 for more information on wildfire risk.) These records, drawn from the NCEI database, illustrate the wide variety of impacts that lightning poses to the planning area.

May 29, 1995 – Lightning struck a soccer goal post and injured six adults viewing a soccer game. Although no one received a direct hit, one woman was hospitalized.

September 4, 1995 – Two people were injured when lightning struck their home. The lightning entered in the attic where it sparked a small fire. It then travelled through the walls exploding a mirror that sprayed glass on the residents. Damages were estimated at \$4,500.

July 3 - 5, 1996 – Lightning from a fast moving thunderstorm blasted a large hole in the side of a house in Lakewood, southwest of Denver. Lightning sparked a small fire near Buffalo Creek. Only one acre was burned before the fire was contained.

September 2, 1996 – Lightning sparked a brush fire in the south buffer zone of the Rocky Flats Environmental Test Facility. No structures were damaged but the fire burned approximately 100 acres of grassland before it was contained.

July 29, 1997 – A woman received minor injuries when lightning struck her when it passed through the office window. She suffered temporary blindness for approximately 15 minutes.

August 13, 2000 – Lightning sparked three separate grassfires near Golden. The fires were quickly contained, however.

May 30, 2001 – Lightning ignited a fire which destroyed a luxury home on Bear Mountain near Evergreen, resulting in a recorded \$1 million in property damage.

May 27, 2002 – Lightning sparked a wildfire near Deckers. Extremely dry conditions and very strong winds the following day allowed the fire to consume 3,860 acres before it could be contained. Thirteen structures were destroyed, including 4 homes. This incident is discussed further in the wildfire hazard profile.

June 19, 2002 – Lightning damaged the Evergreen Fire Protection District (EFPD) repeater. One microwave transmitter, the main fire channel transmitter and two solar panel controllers were ruined. Damage costs were estimated at \$5,000.

August 1, 2001 – Lightning coupled with strong thunderstorm winds knocked out power to approximately 10,000 Xcel Energy customers in Golden.

May 29, 2004 – A father and son practicing on the driving range at the Meadows Golf Club were struck by lightning. The father was killed and the teenage boy was seriously injured. Three other people standing nearby only received minor injuries.

July 23, 2004 – Lightning caused a power outage in Arvada, leaving approximately 9,800 customers without power for 90 minutes.

July 27, 2007 – A man was struck and killed by lightning while jogging at Matthews Winters Park in Morrison. The thunderstorm produced numerous lightning strikes and caused a power outage at Red Rocks Amphitheatre, which forced the cancellation of a concert later in the evening. Damages were reported at \$5,000.

August 4, 2008 – Lightning sparked a grassfire that consumed 300 acres on the northern edge of Green Mountain. Gusty winds and very dry conditions allowed the fire to spread quickly and threaten several homes. Only minor damage was reported, caused by smoke and melted siding. Damages were estimated at \$100,000.

August 16, 2010 – Lightning struck a tree in Morrison; separately, a lightning strike sparked a small grass fire near Quaker Street and Golden Road in Golden. It was quickly extinguished by emergency responders.

May 23, 2011 – Lightning struck a park ranger's office in Evergreen and destroyed a nearby gasoline storage tank. Damages were estimated at \$1,000.

June 6, 2012 – Lightning struck a home in Lakewood, causing extensive electrical damage. Damages were estimated at \$20,000.

July 7, 2014 – A man in Arvada was injured by a nearby lightning strike while he recorded a video of a thunderstorm with his cell phone. He was standing in his garage, when a nearby lightning bolt knocked him out. He suffered overall body aches and had a ringing sensation in one of his ears.

August 8, 2014 – A man in Evergreen suffered minor injuries when he was struck by lightning, which entered through his finger, traveled down his body, and exited his foot.

July 19, 2016 – Two men at the Indian Tree Golf Course in Arvada were struck by lightning when they sought shelter beneath a tree during a rapidly developing thunderstorm. One man suffered minor injuries, while the other died from his injuries.

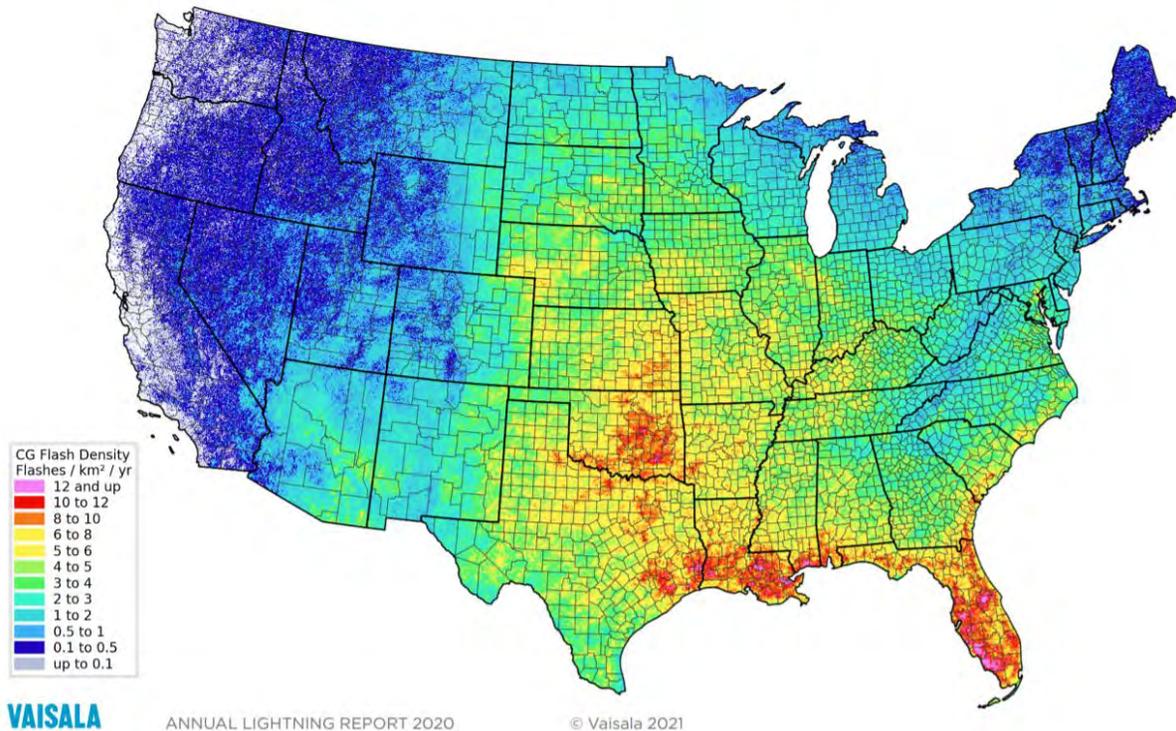
Geographic Extent

The geographic extent for lightning may be examined in two ways. In one regard, ‘lightning’ is a regional hazard measured by the possible places of occurrence. In the other, ‘lightning incidents’ refer to single-point occurrences and are measured according to density. Examining the density of the lightning flashes may yield more useful information, particularly when the impacts of the hazard are examined. According to the NOAA, Jefferson County averages 7,000 lightning strikes per year. This results in approximately 8.9 lightning strikes per square mile per year (7000/785 mi²). Figure 4-41 indicates that, for the most part, Colorado’s Front Range experiences an average density rating that is higher than the rest of the state and much of the country. Therefore, while 100% of the planning area is vulnerable to lightning strikes, the density of these single-point occurrences is fairly limited.

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

Figure 4-41 Cloud-to-Ground Lightning Density

Average U.S. cloud-to-ground flash density in 2015-2019



Source: Vaisala 2020 Annual Lightning Report, <https://www.vaisala.com/sites/default/files/documents/WEA-MET-Annual-Lightning-Report-2020-B212260EN-A.pdf>

Probability of Future Occurrences

As identified earlier, lightning occurs thousands of times a year in Colorado alone. According to information retrieved from NOAA, the planning area receives an average of 8.9 lightning strikes per square mile. This means the planning area, which is 785 square miles in size, experiences an average of 6,987 cloud-to-ground strikes of lightning a year. Knowing that the probability of any lightning event occurring in the future is highly likely helps underscore the importance of increased public education about the hazard. In order to fairly compare the lightning hazard to other hazards in the planning area, the probability of future occurrences for a lightning event that causes damage should also be computed.

The NCEI database is the only available dataset for county-specific lightning incidents that includes property and fire damages. Although this dataset is probably incomplete, it will be used as the source for the probability of occurrence calculation below. If additional lightning data becomes available for Jefferson County, then this section may need to be revisited. However, as all other data sets available reflect information that is consistent with the NCEI effort, the information calculated below is expected to remain fairly consistent with the application of a more comprehensive dataset. There have been 33 NCEI-recorded lightning strikes in Jefferson County since 1995; of these, there were 10 damaging incidents reported in Jefferson County between 1995 and 2020. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. Based on this formula the probability of a damaging lightning strike occurring in any given year is 40%. This corresponds to a probability of future occurrences rating of **highly likely**.

Magnitude and Severity

Impacts for lightning are both direct and indirect. People or objects are directly impacted when struck, or indirectly damaged when the current of the bolt passes through or near the person or object. Other impacts include the ignition of wildfires. The Colorado Division of Homeland Security and Emergency Management estimates that more than half of all forest fires in Colorado are ignited by lightning, in addition to the rangeland and wheat-field fires that lightning causes. Lightning is most likely to cause wildfires during dry conditions or during dry thunderstorms. Records of previous incidents in the NCEI database indicates that most events damage only personal property, and do not significantly impact the availability of critical services or infrastructure, corresponding to negligible severity ratings in both categories. Isolated cases, usually those which trigger large wildfires, have a more significant impact on property damages, but the ratings are still classified as limited.

The National Weather Service Pueblo Lightning Page indicates that between 1980 and 2016, nine people have been killed and 38 people have been injured by lightning strikes in Jefferson County. This equates to 9.1% of all killed and 7.8% of all injured reports for the state. The majority of lightning strikes with casualties for Colorado occurred between the hours of noon and 5:00 pm, peaking between 2:00 and 4:00 pm. This correlates to the times when the population are most exposed, as well: during the temperate summer months, on days where people are most likely to be outside, during peak times of day where outdoor activities are expected to occur. The injury and fatality rates associated with lightning are the greatest indicators of magnitude and severity. It is particularly telling when the flash density of the State is considered. As discussed in the geographic extent section, Colorado experiences an average number of cloud-to-ground strikes when compared to the nation. However, Colorado's injury and fatality ratings are consistently in the top five, or top three when adjusted for population. Therefore, the magnitude and severity of lightning on the population is critical.

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. For lightning, there is no outstanding event of record, so the overall magnitude and severity rating for the County is determined based on the comprehensive discussion of severity contained above. Lightning events typically damage less than 10% of the property in the County. The damages inflicted on critical facilities and services (critical infrastructure) typically result in a loss or disruption of services for less than 24 hours. While direct impacts may be negligible, the indirect impacts listed above, particularly the link to wildfire ignition, raises the magnitude severity ratings for lightning strikes to **limited**.

Climate Change Considerations

According to the 2018 Colorado State Hazard Mitigation Plan, the future impacts of climate induced lightning in Colorado are still unclear. No clear projected trend in the frequency or intensity of warm-season convective storms has been identified for Colorado. Therefore, the intensity and extent of thunderstorm and lightning events is not projected to change. However, according to studies referenced by the National Lightning Safety Institute, it could be possible globally to see an increase of 10-20% in the incidence of lightning with each degree Celsius of global temperature increase. This could potentially lead to higher frequency of occurrence in Colorado.

Vulnerability Assessment

General Property

It is difficult to quantify where specific losses will occur due to the random nature of this hazard. Given the lightning statistics for Colorado and Jefferson County, the County remains at risk and is vulnerable to the effects of lightning. According to NCEI data, \$1.44 million dollars in property damage and \$12,000 in crop damage was reported in Jefferson County over a 20 year period.

People

Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. It is difficult to quantify future deaths and injuries due to lightning, other than to note that future occurrences are likely without increased public education.

Critical Facilities and Infrastructure

Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The effect of wind, combined with lightning, rain and hail, on power delivery is a significant factor when assessing current development exposure. An analysis of this impact is described in the hail vulnerability section. According to the 2018 Colorado State Hazard Mitigation Plan, statewide between 2008 and 2017, the Office of Risk Management (ORM) reported that 48 severe thunderstorm and lightning events damaged state assets. In this timeframe, these events resulted in \$1,041,989 in losses, some of which occurred to critical facilities such as within the state correctional system. Forty-five of the 48 events were due to lightning strikes, equating to \$1,010,944 of the \$1,041,989 in losses. These lightning strikes resulted in damages to building contents such as electric and power equipment connected to the electrical system more than causing structural damage.

Economy

Economic impact of a severe thunderstorm is typically short term. Lightning and high wind events can cause power outages and fires. Generally, long-term economic impacts center more around hazards that cascade from a severe thunderstorm, including wildfires ignited by lightning. Similarly with the previous section, lightning can cause structural damage or damage to electrical systems to private buildings as well as critical infrastructure.

Historical, Cultural, and Natural Resources

According to NCEI data, the average significant lightning strike in Jefferson County occurs every 1.5 years. The strike most likely occurs in the summer, between 12 PM and 5 PM. Thirty-eight percent of damaging lightning strikes cause damage to either property or crops. The greatest losses from lightning result from the secondary hazard of wildfire, which can have cascading impacts on natural resources.

Future Development

New critical facilities such as communications towers should be built with lightning protection measures. As the population continues to increase and the number of people exposed to the hazard increases, it is reasonable to assume that injuries and deaths will also increase proportionately. Construction of lightning shelters at outdoor venues and increased public awareness campaigns may help minimize increased effects of lightning on growing populations.

Overall Hazard Significance

Lightning strikes in Jefferson County have a range of impacts on the planning area. The most serious impacts are the potential for injuries and deaths, with the most serious indirect impact associated with wildfire caused by lightning. The geographic extent of the hazard is considered **limited**. The probability of future occurrences is considered **highly likely** and the magnitude/severity for the event of record is **limited**. The HMPC considers the hazard to have a **low** overall impact on the County. Together, this equates to an overall impact rating of **medium**. This rating recognizes that other hazards may be a higher priority for the County or may possess more actionable mitigation solutions, while still addressing the significant threat that lightning poses to personal life safety for the jurisdiction's citizens. This is also consistent with the efforts of the Colorado Division of Homeland Security and Emergency Management to increase lightning safety and awareness.

4.3.13 Severe Winter Storms

Description

The National Weather Service defines a storm as “any disturbed state of the atmosphere, especially affecting the Earth’s surface, and strongly implying destructive and otherwise unpleasant weather.” Winter storms, then, are storms that occur during the winter months and produce snow, ice, freezing rain, sleet, etc. Winter storms are a yearly occurrence in climates where precipitation may freeze and are not always considered a disaster or hazard. For the purposes of this plan, severe winter storms are those which produce heavy snow, significant ice accumulation, or prolonged blizzard conditions. Disasters occur when the severe storms impact the operations of the affected community by damaging property, stalling the delivery of critical services, or causing injuries or deaths among the population.

Winter storm watches and warnings may be helpful for determining the difference between a seasonal winter storm and a severe winter storm. Warnings are issued if the storm is producing or suspected of producing heavy snow or significant ice accumulations. Watches are usually issued 24 to 36 hours in advance for storms capable of producing those conditions, though criteria may vary between locations. Winter Weather Advisories are issued when a low pressure system produces a combination of winter weather that presents a hazard but does not meet warning criteria. A blizzard warning is issued when conditions are expected to prevail for a period of three hours or longer: sustained wind or frequent gusts to 35 miles an hour or greater; and considerable falling and/or blowing snow (i.e., reducing visibility frequently to less than a ¼ mile).

Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damages are repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

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

Winter storms in Jefferson County, including strong winds and blizzard conditions, may cause localized power and phone outages, closures of streets, highways, schools, businesses, and non-essential government operations, and increase the likelihood of winter-weather related injury or death. People may be stranded in vehicles or other locations not suited to sheltering operations or isolated from essential services. A winter storm can escalate, creating life threatening situations when emergency response is limited by severe winter conditions. Other issues associated with severe winter storms include the threat of physical overexertion that may lead to heart attacks or strokes. Snow removal costs can pose significant budget impacts, as can repairing the associated damages caused by downed power lines, trees, structural damages, etc. Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack saturates soils and melts too quickly.

Geographic Extent

Winter storms are a yearly feature of the Colorado climate and may occur anywhere in Jefferson County. Generally, severe winter storm events are considered regional, which implies the storms impact multiple counties simultaneously, often for extended time periods. It is possible for the geographic extent of the hazard to vary significantly within a single county- a regional storm may directly impact only a small portion of the planning area while still extending over a large portion of the surrounding area. However, even in these instances, the impacts and effects of a regional hazard are still felt within the planning area. Therefore, while the percent of the planning area directly affected ranges from less than 10% to 100% depending on the specific circumstances, if any portion of the planning area is impacted by the storm, then the entire planning area suffers indirect impacts.

Based on this information, the geographic extent rating for severe winter storms is **extensive**.

Previous Occurrences

According to the National Centers for Environmental Information (NCEI) database, there were 274 events reported as impacting Jefferson County over the 20-year period between 2000 and 2020. Events included anything categorized as Blizzard (4 events), Heavy Snow (64 events), or Winter Storm (206). Many of these events impacted multiple counties and spanned several days. Several notable events for the planning area are summarized below.

March 6, 1990 – Winds gusting up to 58 mph and heavy snow whipped into drifts 3 to 4 feet deep pummeled the Metro Denver Area. Streets and highways became impassable as many stores and schools closed. Police and National Guard rescued hundreds of stranded motorists, including the Governor who was stranded on Highway 36. An airliner with 82 passengers aboard skidded off a runway at Stapleton International Airport. Snowfall totaled 18 to 50" in the foothills and between 9 to 24" west of Interstate 25, including most of urbanized Jefferson County.

March 8 - 9, 1992 – A springtime blizzard struck the Metro Denver Area with snowfall amounts of up to a foot and a half blown in on north winds at speeds of 30 to 40 mph with gusts as high as 52mph. Many roads were closed including Interstate 70 east of Denver and Interstate 25 north and south of Denver. Many homes and businesses lost power.

October 24-25, 1997 – One of the worst blizzards of the 1990s dumped 14 to 31 inches of snow across the Metro Denver Area. The heaviest snow occurred in the foothills west and southwest of Denver, including in Jefferson County, where 2' to 4' of snow were measured. Sustained winds of 40 mph with gusts as high as 60 mph reduced visibilities to zero and produced extremely cold wind chill temperatures of -25°F to -40°F. The strong winds also piled snow into drifts ranging from 4' to 10' deep. Several major roads and highways were closed as travel became impossible and Red Cross shelters were set up for hundreds of stranded travelers forced to abandon their vehicles. Two people were severely injured and five people were killed as a direct result of the event. At Denver International Airport, 4,000 travelers were stranded when the airport was forced to close, and air carriers estimated losses at \$20 million (\$26.7 million 2009 dollars). Snowfall totaled 21.9", setting a new 24-hour snowfall record of 19.1" for the month.

March 17 - 20, 2003 – A major snowstorm dumped more than 2' of snow in the Rocky Mountain Region, which closed highways in Colorado and wide sections of Wyoming. Wind gusts of 30 mph reduced visibility across Denver, including the main boulevard leading to Denver International Airport, stranding travelers at the airport and along the roadways. Avalanche warnings were issued for Colorado mountainous areas where up to 29" of snow fell. Upwards of 8' of snow were reported in the Evergreen and Conifer areas of Jefferson County by members of the HMPC. This late season snowstorm stranded hundreds of people and resulted in a Presidential Emergency Declaration to help ease the burden of clean-up costs, which amounted to more than \$8 million. The insurance industry estimates this blizzard to be the most costly winter storm in Colorado history, reporting at least \$93.3 million (\$131.2 million in 2020 dollars) in claims. Jefferson County was designated for emergency public assistance from this event. Figure 4-42 shows the distribution and snow totals in inches for the storm for the County and surrounding areas.

December 2006 – Back-to-back major storms occurred the third and fourth weeks of the month of December across the Front Range and Eastern Colorado. Heavy snow accumulated over three feet deep in some areas. Strong wind drifted the snow into 12' to 20' drifts and thousands of animals in the eastern plain were stranded from shelter and food by the snow. Travel was hampered for days in the hardest hit areas, including the Denver International Airport. Combined, these events qualified for a Presidential Emergency Declaration to assist communities with costs in the aftermath. Jefferson County was designated for public assistance after the first storm.

April 16, 2008 – Storm totals ranged from 9" to 13". A storm system brought heavy snow to parts of the North-Central Mountains, Front Range Foothills and Palmer Divide. The heaviest snow fell mainly south of the Interstate 70 corridor. Storm totals in the mountains and foothills ranged from 8" to nearly 15".

January 12, 2009 – A fast moving storm system brought heavy snow to the foothills of Boulder and Jefferson Counties as well as the western and southern suburbs of the metropolitan Denver. The storm

resulted in multiple accidents along the Urban Corridor. In the foothills storm totals ranged from 6 to 8". In the suburbs, Lakewood reported 8", with variances across the area ranging from 4.5 to 11".

March 26, 2009 – At Denver International Airport, hundreds of flights were canceled. In addition, schools throughout the region were shut down and many roads closed due to multiple accidents. Dozens of vehicles slid off Interstate 25 and an accident between Fort Collins and Cheyenne, Wyoming involved up to 75 vehicles. Portions of U.S. Highway 36, between Denver and Boulder, were also closed during the day. The Red Cross opened six shelters for stranded motorists. Snow totals in and near Jefferson County averaged 11.5 inches.

May 11-12, 2014 – A strong storm system moved from southwest Colorado and produced heavy snow over the Front Range and adjacent plains. The snow was heaviest over the Front Range foothills where up to 2-1/2 feet of snow was observed. In the mountains and foothills, storm totals included: 12 inches at Arapahoe Ridge and Columbine; 11 inches at Evergreen and Fremont Pass. Along the urban corridor and Palmer Divide, storm totals included: 10 inches at Ken Caryl; 9 inches at Superior; 8 inches near Morrison; 7 inches in Denver, near Franktown, Golden, Lakewood and Highlands Ranch; 6 inches, 5 miles northeast of Westminster, 7 miles south of Lyons, near Parker and Shaw.

April 15-17, 2016 – A powerful spring snowstorm brought heavy, wet snow to areas in and near the Front Range Foothills and Palmer Divide. Storm totals generally ranged from 2 to 4 feet in the Foothills with 1 to 2 feet across the Mountains and Palmer Divide. Front Range Urban Corridor had amounts ranging from 6 to 20 inches with the highest totals across the western and southern suburbs. Numerous but mostly temporary road closures from 1 to 5 hours occurred throughout the storm, including major routes like I-70 and Highway 103 throughout Jefferson County. Snow accumulations totaled 46 inches in Conifer, 42 inches in Genesee, and 29.5 inches near Evergreen. Several hundred flights were reported cancelled at Denver International Airport in this event.

March 13, 2019 – A rare “bomb cyclone” blizzard brought record low barometric conditions to the Denver Metro area, creating widespread blizzard conditions and heavy snow, leading to significant road, school, and business closures.

March 13-14, 2021 – The 4th largest snowstorm in Denver’s recorded history dropped 27.1” of snow in the Denver Metro area, making March 2021 the second snowiest March on record. Overall impacts in Jefferson County were relatively minor, but it took several days to fully clear the roads.

Often, total snowfall is one of the major considerations in tallying a ‘severe’ winter storm. The top ten snowfall storms for the Denver Metro region since 1946, according to the National Weather Association, are listed in Table 4-55. It is helpful to remember that the official reckoning for snowfall in Denver is at the airport (Stapleton Airport until February 1995 and currently at Denver International Airport) and that snowfall totals may actually be higher for Jefferson County, particularly in the western communities.

Table 4-55 Top Ten Snowfall Storms in the Denver Metro Area since 1946

Date	Snowfall in Inches
March 18, 2003	31.8"
November 3, 1946	30.4"
March 13-14, 2021	27.1"
December 24, 1982	23.8"
October 25, 1997	21.9"
November 27, 1983	21.5"
November 19, 1991	21.2"
December 20, 2006	20.7"
March 5, 1983	18.7"
November 19, 1979	17.7"

Source: National Weather Service Weather Forecast Office: Denver/Boulder area

Probability of Future Occurrences

Winter storms are a yearly feature in Colorado, often occurring multiple times each winter, and thus are considered a seasonal feature. In that regard, these hazards are considered a highly likely occurrence. When an event is seasonal and an anticipated element in a given climate, it is also important to examine the probability of future severe occurrences of the hazard.

According to the NCEI database, there have been 274 catalogued events over a 20-year period, or approximately 14 events per year. There have been at least 10 incidents of severe winter storms that have resulted in severe impacts to Jefferson County since 1990. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a severe winter storm occurring in any given is almost certain. This corresponds to a probability of future occurrences rating of **highly likely**.

Magnitude and Severity

The damages caused by severe winter storms and blizzards vary and are dependent on several factors: the duration of the storm; the geographic extent; the time of year; meteorological factors such as wind, moisture content of the snow, ground and air temperatures; and the advance warning of the storm. Impacts from the storm dictate the magnitude of the event, emphasizing that how much snow falls may not always directly correlate to how bad the storm is. Damaged power lines and dangerous or impassable roadways may forestall the delivery of critical services such as medical and emergency assistance, the delivery of food supplies and medications, or even the provision of basic utilities such as heat and running water. When events happen with a long warning time, it is possible to pre-mitigate the effects of insufficient supply levels or to pre-test emergency generators, which may prevent some of the previously described impacts from occurring. Unanticipated storms increase the number of people stranded, both in cars and at public locations, which may increase the number of injuries and deaths attributed to the event (often caused by exposure) and place uneven and unanticipated strains on public sheltering capacities. The weight of the snow, driven by the water content of the fall, increases the potential for damages caused to structures and trees. Lighter snow caused by extreme cold increases the damages caused to livestock, agriculture, and landscaping due to freezing conditions. Winter storms which go through periods of thaw and freeze prolong dangerous icy conditions, increasing the likelihood of frozen and damaged water pipes, impassable or dangerous roadways, damaged communication lines, or more extensive damages to infrastructure and structures caused by seeping water freezing under roofs, porches, patios, inside sidings, or causing damage to vehicles.

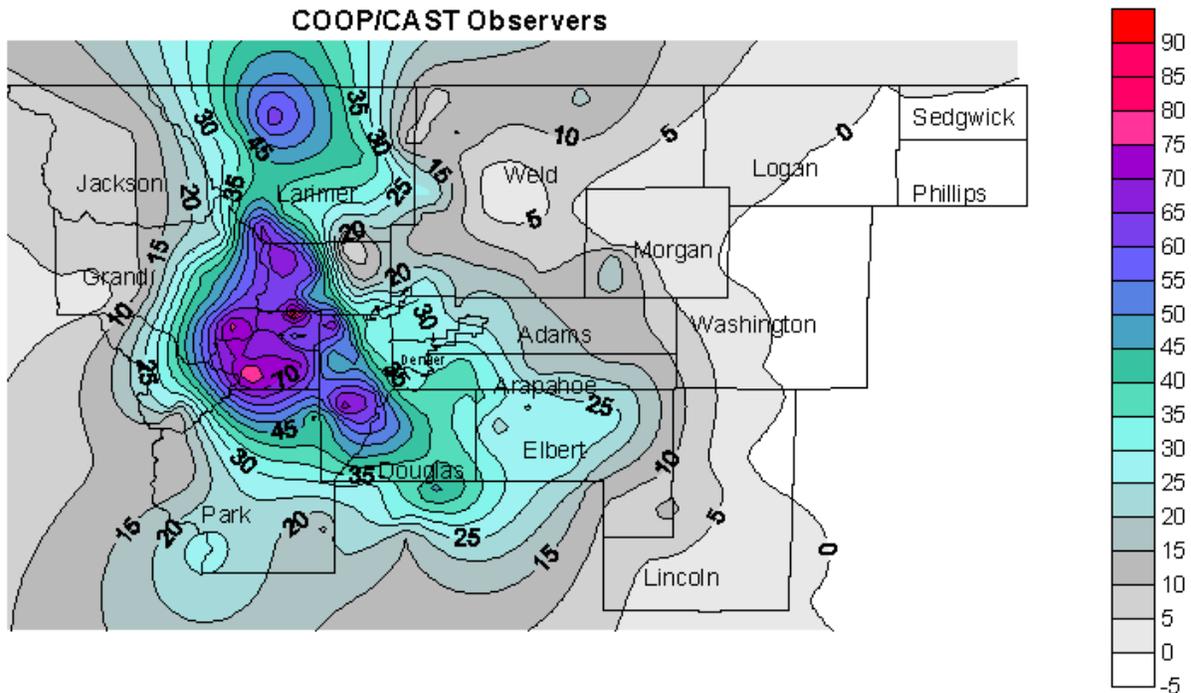
Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others it is a reflection of common occurrence. The most damaging event of record for Jefferson County occurred between March 17 and March 20, 2003. This is distinct from the snowstorm with the greatest amount of snowfall, which occurred from December 1-6, 1913, and officially documented 45.7 inches of snow. In order to reflect the significance of each, both events are considered in developing the severity and magnitude ratings.

As noted, the December 1913 storm snow totals in the metro area were officially recorded at 45.7 inches. Snow totals were even deeper in the mountains, where Georgetown reported 86 inches total. The high winds caused significant drifting which completely blocked all transportation. The Rocky Mountain News reported that one rescue party and eight miners were lost in the storm and thousands more moved into hotels for shelter. The city opened the auditorium and other public buildings to shelter the homeless during the event. Of interesting note, the snow removal costs were considered an economic advantage, citing that over 780 men found employment and at least \$700 (\$18,300 in 2020) was spent in snow removal costs. The paper also reported that "(m)illions of dollars [in] additional wealth to Colorado were brought yesterday by the snowfall...it rang up the curtain on the 1914 crop outlook, revealing visions of unprecedented prosperity to every line of industry and bountiful harvest to the farmers."

The March 17-20, 2003 snowfall in the metro area was officially tabulated at 31.8 inches, though up to eight feet of snow was reported in the Evergreen and Conifer areas. Detailed snowfall totals across the

region from this event are depicted in Figure 4-42. The event damaged huge amounts of infrastructure and property, with insurance losses alone estimated at more than \$93.3 million (\$131.3 million in 2020 dollars). Insurance losses note that more than 90% of those damages were based on homeowner’s insurance claims, and that of the auto insurance claims, most were a result of the vehicle being crushed by the weight of the snow rather than weather-related accidents. The event also resulted in a Presidential Emergency Declaration. The damages inflicted on critical facilities and services (critical infrastructure) resulted in a loss or disruption of services for several days, including power, telephone, and in some cases, heat. Emergency response personnel were hindered from response due to impassible roadways. Documented illnesses and injuries were considered critical, with two serious reported injuries and five directly attributed deaths. The medical response of the region was considered impaired to a limited extent.

Figure 4-42 March 17-20, 2003 Snowfall Totals



Source: National Weather Service Forecast Office: Denver/Boulder CO

Based on these factors, the magnitude severity potential for severe winter storms which may impact Jefferson County are considered **critical**.

Climate Change Considerations

Climate change has the potential to exacerbate the severity and intensity of winter storms, including potential heavy amounts of snow. A warming climate may also result in warmer winters, the benefits of which may include lower winter heating demand, less cold stress on humans and animals, and a longer growing season. However, these benefits are expected to be offset by the negative consequences of warmer summer temperatures.

Vulnerability Assessment

All assets located in Jefferson County can be considered at risk from severe winter storms, although based on historic records they are a higher risk for areas between 6,000 and 9,000 feet and areas higher in the mountain above 9,000 feet. Severe winter storms affect the entire planning area and its jurisdictions including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents

within structures. A timely forecast may not be able to mitigate the property loss but could reduce the casualties and associated injury.

General Property

High snow loads can cause damage to buildings and roofs. Most property damages with winter storms are related to the heavy snow loads and vehicle accidents. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). Vulnerability is influenced both by architecture and type of construction material and should be assessed on a building-by-building basis.

People

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. The highest risk will be to travelers that attempt to drive during adverse conditions. People can also become isolated from essential services in their homes and vehicles. While virtually all aspects of the population are vulnerable to the potential indirect impacts of a winter storm, others may be more vulnerable, such as individuals with access and functional needs, who may become isolated to essential services.

The weight of heavy snowfall and/or ice accumulating on power lines often brings them to the ground, causing service disruptions for thousands of customers. According to data from the U.S. Department of Health and Human Services' emPOWER mapping site, 12,629 of the 115,998 Medicare Beneficiaries in the county rely on electricity-dependent medical equipment such as ventilators to live independent in their homes. In addition, prolonged power outages can also have economic impacts if there is a loss of food in grocery stores and other businesses.

Cold and extreme cold temperatures have been the main cause of winter weather related casualties in the County. Infants, elderly, and the homeless population are most vulnerable to the impacts of extreme cold. Exposure to extreme cold can cause frostbite or hypothermia and, in some cases, even death.

The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to infrastructure. Travelers on I-70 and Highway 285 in the mountainous portions of the planning area, can become isolated and visitors can become stranded, requiring search and rescue assistance and shelter provisions.

Critical Facilities and Infrastructure

Roads are especially susceptible to the effects of a severe winter storm, which can temporarily hinder transportation and require resources for snow removal. As noted under the people section, heavy snow accumulation may also lead to downed power lines not only causing disruption to customers but also have potentially negative impacts on critical facilities in the county which may have cascading impacts on the local governments' ability to operate.

Economy

Closure of major transportation routes during severe winter storms could temporarily isolate communities in Jefferson County and further isolate the more remote areas of the County. Depending on the length of the closure it could also hinder the local economy by disrupting tourism and out of county visitors, and as well as the potential impacts to shipping delays from a closure of I-70. Snow removal costs can also impact budgets significantly.

Power outages may lead to business closures as was seen in the 2019 Bomb Cyclone event with impacts lasting for multiple days in some areas.

Xcel Energy provided data for the number customers within their service area who experienced loss of power supply caused by snow and ice. As with extreme temperatures and wind/hail, Xcel estimates that outages cost the utility approximately \$50,000 per 20,000 people affected.

In a typical year (based on historic Xcel data from 2006-2009) utility customers in Jefferson County experience 2 days of service interruption due to snow and ice per year impacting (on average) 48,809 people per outage. FEMA standard values for loss of service for utilities estimate that a power supply

interruption costs the average person \$126 per day of service outage. This equates to an average annual loss of \$12,299,868 based on power outages due to snow and ice.

Historical, Cultural, and Natural Resources

Natural resources may be damaged by the severe winter weather, including broken trees and death of wildlife. Unseasonable storms may damage or kill plants and wildlife, which may impact natural food chains until the next growing seasons. Most of these impacts would be short-term. As noted previously, older, historic buildings could potentially be more vulnerable to roof and structural damage from heavy snow.

Future Development

Future residential or commercial buildings built to code should be able to withstand snow loads from severe winter storms. Population and commercial growth in the County will increase the potential for complications with traffic and commerce interruptions associated winter storms, as well as increased exposed populations vulnerable to the impacts of a severe winter storm such as power outages or delays in vital services. Future power outages or delays in power delivery to future developments may be mitigated by construction considerations such as buried power lines. Future development will also require future considerations for snow removal capacity including equipment, personnel, logistical support, and planning for snow storage areas. Adequate planning will help establish the cost-effective balance.

Public education efforts may help minimize the risks to future populations by increasing knowledge of appropriate mitigation behaviors, clothing, sheltering capacities, and decision making regarding snow totals, icy roads, driving conditions, and outdoor activities (all of which are contributors to decreased public safety during severe winter storms.) New establishments or increased populations who are particularly vulnerable to severe winter storms (such as those with health concerns or those who live in communities that may be isolated for extended periods of time due to the hazard) should be encouraged to maintain at least a 72-hour self-sufficiency as recommended by FEMA. Encouraging contingency planning for businesses may help alleviate future economic losses caused by such hazards while simultaneously limiting the population exposed to the hazards during commuting or commerce-driven activities.

Overall Hazard Significance

Severe winter storms in Jefferson County have a significant impact on and presence in the planning area. Damages from winter storms are the second highest cause of insurance-related costs and claims for the County. The planning area is subjected to damaged trees and structures, icy and dangerous roadways, and the large costs associated with snow removal and cleanup after severe events. In addition, the hazard is regional in nature, indicating that if the planning area is impacted, it is likely that the planning area's immediate neighbors will also be impacted, reducing the available resources and aid capacities for response and recovery from the event.

The geographic extent of the hazard is considered **extensive**. The probability of future occurrences is considered **likely** and the magnitude/severity for the event of record is **critical**. In addition, the HMPC considers the hazard to have **high** impact on the County. This equates to an overall impact rating of **high**.

4.3.14 Subsidence

Description

The Colorado Geological Survey defines land subsidence as the sinking of the land over manmade or natural underground voids. Subsidence occurs naturally and also through man-driven or technologically exacerbated circumstances. Natural causes of subsidence occur when water in the ground dissolves minerals and other materials in the earth, creating pockets or voids. When the void can no longer support the weight of the earth above it, it collapses, causing a sinkhole depression in the landscape. Often, natural subsidence is associated with limestone erosion, but may also occur with other water-soluble minerals. Man-driven or technology-exacerbated subsidence conditions are associated with the lowering of water tables, extraction of natural gas, or subsurface mining activities. As the underground voids caused by these activities settle or collapse, subsidence occurs on the surface. In Jefferson County, past coal and clay mining activities have created surface subsidence in some areas and created the potential for subsidence in other areas. Any area where past sub-surface mining was documented has some risk of subsidence; however, tracking these areas is difficult. In some cases, coal was “poached” or more coal was removed from an area than would be noted on the mine map. Also, many mines were incorrectly located relative to surface features due to surveying errors. As such, maps of past mine workings and extents may be incorrect, but rough estimates are available.

Extraction of coal and clay from mines in Jefferson County varied based on the location of the material beds and the available technology. Prior to World War II, nearly all mines in the County were worked using the room and pillar mining pattern. In the room and pillar technique, an opening was followed by a shaft that was driven or dug to the layer of coal or clay. Passageways were excavated in the material seam, and rooms were created when the materials were dug out along the original tunnel. The materials were then worked in the direction that correlated to the bed. Between the rooms, pillars of the material were left in place to support the roof of the mine, although sometimes the pillars were replaced with timbers. Subsidence occurs when the stopes collapse, either due to overhead pressure or when the support structures collapse. Other subsidence incidents may occur over air shafts and man shafts. This subsidence forms pits, which may range in diameters of 5' to 20' and range in depth from a few feet to 20', depending on the amount of in-filling which has occurred since the mine was abandoned. Because subsidence incidents are often incomplete, an event may occur multiple times over the same area, increasing the risk and danger of this particular type of subsidence.

Troughs, or long lengths of subsidence, tend to occur over tunnels and slope entries, and may range in length from 10' to 80' and in depth from 5' to 15' or more. Once they collapse, they present a reduced additional risk, as the subsidence is generally complete along the entire length of the tunnel. Another common form on subsidence in Jefferson County occurs when pits and trenches open over stopes that were extended to, or very close to, the surface during the mining process. These features are particularly evident along the east side of the Dakota Hogback from I-70 north to Coal Creek Canyon and range in length from 10' to 100' and in widths of 5' to 40'. This form of subsidence forms a minimal risk in the planning area, as it occurs in areas where development is highly regulated, but additional risks from these features are documented below. Subsidence over reclaimed land occurs when open pit mines are cosmetically back-filled, but the fill is not as compacted as the enclosing bedrock. When construction on the fill material occurs, the weight causes the fill material to compress more than the bedrock, creating a stress or bending movement in the structure, which can result in significant damage to the structures.

Subsidence may result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate natural processes of subsidence, or incur subsidence over manmade voids. Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the empty space previously occupied by water or soluble minerals. The consequences of improper use of land subject to ground subsidence can be excessive economic losses, including the high costs of repair and maintenance for buildings, irrigation works, highways, utilities, and other structures. This results in direct economic losses to citizens as well as indirect economic losses through increased taxes and decreased property values.

Geographic Extent

Areas of Jefferson County at risk for subsidence are shown in Figure 4-21 on the map of dipping bedrock and subsidence. Coal deposits in Jefferson County were located mostly along the northeastern borders shared with Boulder, Adams, Denver and Arapahoe counties. Known coal mines in the County were confined along a narrow strip of land along Highway 93 from Arvada to approximately the junction with C-470, and then along the C-470 corridor, without known extent into the northeastern portion of the coal field. As such, the location of inactive coal mines in the County is limited compared to other counties (see Figure 4-43).

Previous Occurrences

Most known areas of potential subsidence in the planning area occur in rural, undeveloped areas and, therefore, have caused no damage. However, there are few records on subsidence. In addition, the planning area exercises specific planning and zoning regulations to minimize the structures permitted on vulnerable lands, as demonstrated in Table 4-57.

While actual events of subsidence are visible throughout the County, extensive research on the hazard produced only one reportable incident. A family housing section built on the Colorado School of Mines campus, located in Golden, suffered damage when subsidence occurred over a reclaimed open-pit clay mine. Though the structures were built with mitigation techniques, differential compaction still occurred. Streets and sidewalks suffered damage, as did the structural integrity of several buildings. This report is contained in a County profile issued in 1978 and additional confirmation of the event, along the fate of the structures and associated damage estimates, are not currently available.

Figure 4-43 Locations of Inactive Coal Mines, State of Colorado

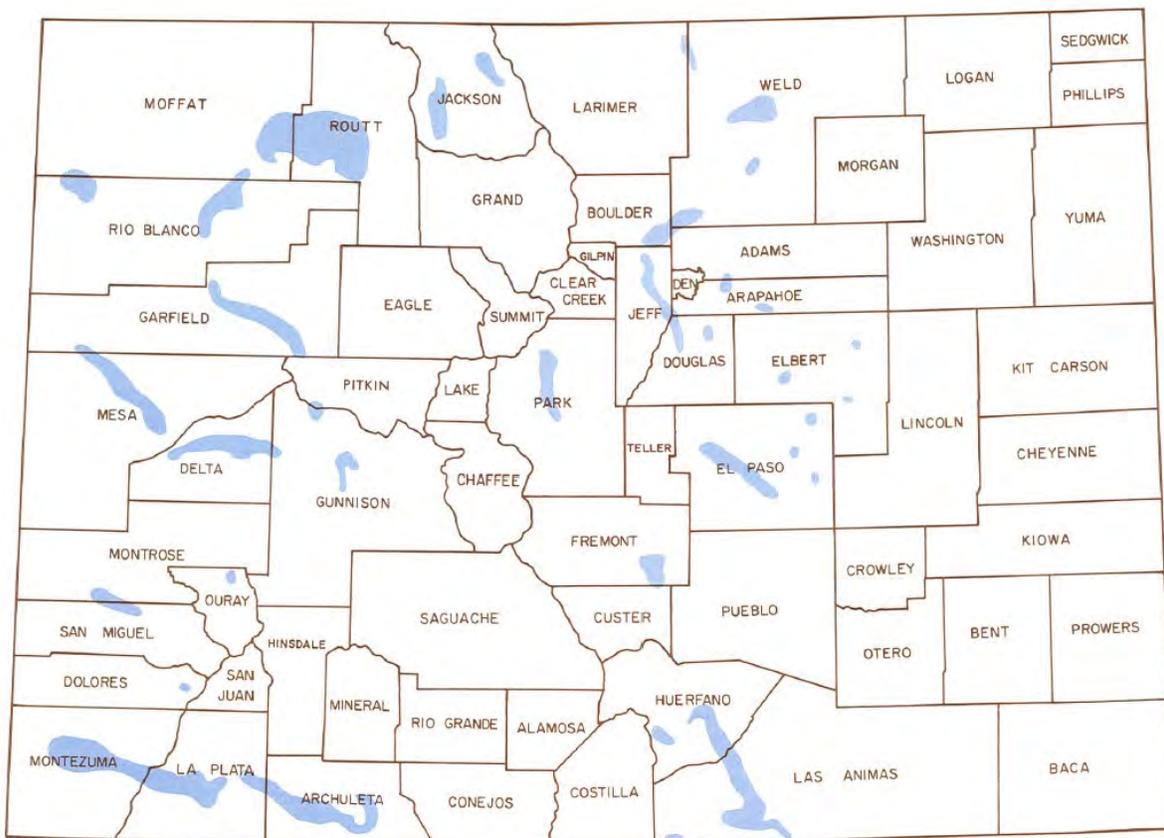


Figure 5. General locations of Inactive Coal Mines in Colorado.

Source: Subsidence above Inactive Coal Mines

According to the State Hazard Mitigation Plan, Jefferson County hosts 48 abandoned coal mines and 100 other types of abandoned mines. According to the Colorado Division of Reclamation and Safety, as of February 2021 there are 111 mine permits in the County and 17 of those permits are active. The majority of the mines permitted, inactive and active, are for sand and gravel, followed by clay, and then aggregate. There is one permitted, but inactive, coal mine in the County in Township 6S 69W.

Figure 4-21 illustrates the areas of suspected or known subsidence for Jefferson County, as determined by the County Geological Hazards data layer. The area, marked brown, only minimally corresponds to the areas of inactive coal mines in the County, and accounts for some subsidence vulnerabilities due to clay mining. Of note is the large area of vulnerability in unincorporated Jefferson County and portions of the City of Arvada, which is located south of Rocky Flats Lake and north of Arvada Reservoir, which extends east from Highway 93. While some of this area is open space, there is residential housing development that has occurred within the suspected area. In Golden, developments along Highway 93 are exposed to the risk as well from the northern edge of the city down until just north of the junction of Highway 93 and Highway 6. In the areas east and north of C-470, subsidence hazard areas are located along several developments along Kipling in Lakewood and the unincorporated County. Other potential subsidence areas are in western Lakewood on the south side of Green Mountain, near the recent Solterra development. This amounts to only a small portion of the total developed landmass in the County - somewhere between 10% and 25%.

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

Probability of Future Occurrences

This assessment was conducted to maintain consistency with other hazards profiled in this planning effort but represents some significant problems. As the data of previous occurrence is skewed, the accuracy of future probability predictions is heavily impeded. In addition, the existing mitigation efforts in the planning area heavily restrict development in subsidence-prone areas, which reduces the number of occurrences that cause damages, and therefore, reduces the number of occurrences that are reported.

There has only been 1 reported incident in Jefferson County that caused property damage since 1978. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of subsidence occurring in any given year is 2.4%. This corresponds to a probability of future occurrences rating of **occasional**.

Magnitude and Severity

The greatest dangers associated with subsidence are related to property damages incurred by the hazard. There are minimal risks to injury and death from unexpected subsidence or accidental exposure to it, but the risk is possible. No injuries or deaths related to subsidence have been reported in the planning area, but the State Hazard Mitigation plan documented two injuries related to subsidence in the state.

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it reflects common occurrence. In this case, there is no event of record for the County related to subsidence. Instead, estimates based on predicted areas of vulnerability are used to complete the assessment for comparison purposes to other hazards profiled in this plan. The developed areas with the greatest vulnerability to known subsidence areas is in the neighborhoods just north and just south of the C-470 corridor on the western border of the urbanized planning area in Lakewood. Widespread subsidence in the area could damage houses, retail facilities, roads, sidewalks, utilities infrastructure, and critical infrastructure facilities located in the area. Such an event would not be expected to impact overall delivery of essential services and functions to the planning area, though the affected community may be affected for weeks as water, gas, power lines, roads, and houses are repaired. If events are severe enough, structures may be deemed unsafe for continued occupancy, forcing residents to relocate. Injuries or deaths are possible, but not expected, in such an event.

Based on these factors, the magnitude severity ratings for subsidence are considered **limited**, based on the dollar amount of property damage incurred.

Climate Change Considerations

Changing climate conditions are not anticipated to affect subsidence.

Vulnerability Assessment

Existing Development

Existing development makes up almost all of the risk to subsidence in the planning area; the hazard rating for subsidence was elevated based on the existing development vulnerabilities and losses. The areas of subsidence vulnerability, as identified earlier in this section, make up a fairly limited area of the County. However, there are areas of Golden, Arvada, Lakewood, and the unincorporated County that are already developed, which means there is exposure to the hazard. Once the land is developed, subsidence mitigation becomes extremely expensive. In addition, poor or inaccurate mapping of former mining efforts may lead to unknown areas of vulnerability which are only discovered after the land is developed, when pre-emptive techniques are unavailable. Vulnerable construction includes roads, homes, business, and landscaped recreational areas. Dangers include damage caused to structures or roads and the secondary impacts such as injuries to occupants or passers-by, the rapid development of deep holes under people or cars which results in injury, death and/or property damage, and the fiscal cost of the damages.

Methodology

GIS was used to create a risk assessment for geological hazards in Jefferson County. Subsidence hazard data was overlaid on Jefferson County parcel and assessor’s data. For the purposes of this analysis, a GIS layer of address points was used to identify potential structures exposed to the hazard, combined with parcel-based information. Subsidence hazard data was then overlaid on the address points. If the address point intersects the hazard layer, the hazard is assigned for the entire parcel. The model assumes that every parcel with a structure value greater than zero is improved in some way. Specifically, an improved parcel assumes there is a building. The parcel, its improvement value and estimated content value are listed in Table 4-56 and Table 4-57.

Results are sorted by occupancy type and by jurisdiction to demonstrate how the hazard’s risk varies for all property types across the planning area. According to this analysis, all jurisdictions have seen an extremely large increase of exposed properties to subsidence since 2016. Over \$38 billion of total structure value is exposed to subsidence. This is a 50-fold increase from \$750 million of total value of exposed properties in the 2016 plan. It is difficult to estimate potential losses beyond this exposure analysis, however these values are included as a reference. Unincorporated jurisdictions have the greatest exposure to the hazard, with a total of nearly \$17 billion of exposed structure total value and over 67,000 persons. Arvada also surpassed Golden with greater total value exposure to subsidence since the 2016 plan. This analysis does not account for site investigations or mitigation that may have occurred during subdivision development.

Table 4-56 Improved Properties Exposed to Subsidence in Jefferson County

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Arvada	11,116	11,411	\$4,468,492,106	\$2,401,836,700	\$6,870,328,806	27,850
Golden	5,134	6,221	\$3,272,708,675	\$2,320,286,196	\$5,592,994,871	12,277
Lakewood	14,172	14,987	\$5,559,542,300	\$3,055,937,501	\$8,615,479,801	33,231
Littleton	730	730	\$323,311,784	\$161,655,892	\$484,967,676	2,206
Morrison	155	188	\$65,397,995	\$42,503,428	\$107,901,423	279
Unincorporated	26,264	27,162	\$10,899,622,635	\$6,010,852,181	\$16,910,474,816	67,445
Total	57,571	60,699	\$24,589,075,495	\$13,993,071,898	\$38,582,147,393	143,289

Source: Jefferson County GIS

Table 4-57 Improved Properties Exposed to Subsidence in Jefferson County by Building Type

Jurisdiction	Property Type	Improved Parcels	Building Parcels	Total Value	Population
Arvada	Agriculture	1	1	\$3,146,514	
	Commercial	75	120	\$299,008,526	
	Exempt	16	20	\$135,097,064	
	Industrial	26	28	\$107,768,630	
	Mixed Use	9	12	\$60,680,674	
	Residential	10,989	11,230	\$6,264,627,398	27,850
	Total	11,116	11,411	\$6,870,328,806	27,850
Golden	Agriculture	1	1	\$70,874	
	Commercial	261	360	\$1,034,458,800	
	Exempt	59	124	\$652,011,360	
	Industrial	159	176	\$515,077,410	
	Mixed Use	62	79	\$225,062,544	
	Residential	4,592	5,481	\$3,166,313,883	12,277
	Total	5,134	6,221	\$5,592,994,871	12,277
Lakewood	Commercial	141	259	\$719,468,156	
	Exempt	39	49	\$312,706,774	
	Industrial	6	9	\$19,943,388	
	Mixed Use	27	31	\$40,581,054	
	Residential	13,959	14,639	\$7,522,780,430	33,231
	Total	14,172	14,987	\$8,615,479,801	33,231
Littleton	Commercial	1	1	\$1,524,450	
	Exempt	1	1	\$3,131,988	
	Residential	728	728	\$480,311,238	2,206
	Total	730	730	\$484,967,676	2,206
Morrison	Commercial	20	36	\$13,052,412	
	Exempt	6	6	\$19,840,302	
	Industrial	2	2	\$1,206,440	
	Mixed Use	8	9	\$4,394,704	
	Residential	119	135	\$69,407,565	279
	Total	155	188	\$107,901,423	279
Unincorporated	Agriculture	21	23	\$6,921,186	
	Commercial	282	448	\$1,256,358,358	
	Exempt	76	99	\$431,633,214	
	Industrial	49	110	\$230,856,088	
	Mixed Use	27	33	\$179,880,956	
	Residential	25,809	26,449	\$14,804,825,015	67,445
	Total	26,264	27,162	\$16,910,474,816	67,445
Grand Total	57,571	60,699	\$38,582,147,393	143,289	

Source: Jefferson County GIS

*The Assessor's Office values buildings for the specific purpose of valuation for ad valorem tax purposes and values represented do not reflect actual building replacement values.
 **The Assessor does not have data about the contents of structures and the contents values shown in the table are not derived from Assessor data but are estimates based upon the structure value using FEMA recommended values.

Table 4-58 displays the critical facilities at risk to subsidence in the planning area. Golden contains the most critical facilities exposed to subsidence with 15, an increase from seven in 2016. Arvada and unincorporated jurisdictions have seven and five critical facilities exposed to subsidence, respectively.

Table 4-58 Critical Facility Exposure to Subsidence

Jurisdiction	FEMA Lifeline	Critical Facility Type	Count
Arvada	Communications	Land Mobile Private Towers	2
	Communications	Microwave Service Towers	2
	Energy	Electric Substation	2
	Energy	Power Plant	1
		Total	7
Golden	Communications	Land Mobile Private Towers	4
	Communications	Microwave Service Towers	5
	Food, Water, Shelter	Water Facility	1
	Safety and Security	Government Facility	2
	Safety and Security	School	1
	Transportation	Bridge	2
		Total	15
Unincorporated	Communications	Land Mobile Private Towers	3
	Hazardous Material	Tier II	2
		Total	5

Source: HIFLD and CERC

Future Development

As noted in the hazard profile section there are areas of western Arvada, Lakewood and unincorporated areas along the highway 93 and 470 corridors that are experiencing growth in and near potential subsidence hazard areas. Subsidence-resistant construction and mitigation efforts during construction are more cost effective than retroactive mitigation efforts and helps prevent damage from occurring. As such, vulnerability to this hazard is not anticipated to increase with new development, provided that land use planning and engineering regulations and practices are followed. Increased efforts to monitor mining operations, increased accuracy of mapping of former mining works, and emphasis on appropriate grading and ground compaction during development will help alleviate vulnerability for future development in unknown areas of risk. In many ways, the efforts of Jefferson County to pre-empt the subsidence hazard (along with the erosion and swelling soils hazards) is a best-practices example for successful mitigation efforts and projects.

Other development that could occur in or near potential subsidence areas include the proposed Northwest Parkway, a segment of a toll road that has been studied and planned for several years to connect E470 and C470 north of Golden and through western Arvada.

Overall Hazard Significance

Subsidence events in Jefferson County have had minimal impacts on the planning area, due in large part to careful land use planning. The geographic extent of the hazard is considered **limited**. The probability of future occurrences is considered **occasional** and the magnitude/severity for the event of record is **limited**. In addition, the HMPC considers the hazard to have a **low** overall impact on the jurisdiction. This equates to an overall impact rating of **medium**.

This rating is based on the current development policies in place in the County, which limit construction in vulnerable areas. If previously unknown areas of subsidence are discovered, particularly in already-developed areas, this assessment may change. In addition, as development continues out and below the areas of mines worked in steep-slope conditions, those properties may experience a higher vulnerability to landslides caused by subsidence in those areas. This information is also addressed in the landslides profile and can be avoided with continued good mitigation practices.

4.3.15 Tornado

Description

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. They can have the same pressure differential that fuels 300 mile wide hurricanes across a path less than 300 yards wide. Closely associated with tornadoes are funnel clouds, which are rotating columns of air and condensed water droplets that unlike tornadoes, do not make contact with the ground.

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. Tornadoes have been known to lift and move objects weighing more than 300 tons a distance of 30 feet, toss homes more than 300 feet from their foundations, and siphon millions of tons of water from water bodies. Tornadoes also generate a tremendous amount of flying debris or “missiles,” which often become airborne shrapnel that causes additional damage. If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, roofs, and walls. However, the less spectacular damage is much more common.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 4-59 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at various levels of intensity. Table 4-59 shows the wind speeds associated with the Enhanced Fujita Scale ratings compared to the original Fujita scale.

Table 4-59 Original and Enhanced Fujita Scales

Fujita Scale		Enhanced Fujita Scale	
F Number	Wind Speed (mph)	EF Number	Wind Speed (mph)
0	40-72	0	65-85
1	73-112	1	86-110
2	113-157	2	111-135
3	158-207	3	136-165
4	208-260	4	166-200
5	261-318	5	201+

Source: National Oceanic and Atmospheric Administration

Tornadoes form when cool, dry air sits on top of warm, moist air. In Colorado, this most often happens in the spring and early summer (i.e., May, June, and July) when cool, dry mountain air rolls east over the warm, moist air of the plains during the late afternoon and early evening hours. However, tornadoes are possible anywhere in the state, at any time of year and at any point during the day.

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, most injuries and deaths result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Tornadoes which affect the developed portions of Jefferson County are more likely to cause high dollar damage amounts.

Geographic Extent

Tornadoes are possible anywhere in Colorado, even in mountainous terrain. In 2007, a tornado damaged thousands of trees outside of Woodland Park in Pike National Forest in Teller County. Teller County intersects the southeastern-most corner of Jefferson County. The severe weather conditions that spawn tornadoes are regional events which may impact any extent of the County at a given time, and in this

regard, the possible geographic extent for tornadoes is **extensive**. However, tornadoes as a stand-alone event are single-point (or limited point) occurrences similar to lightning. While knowing that the entire planning area is vulnerable to a tornado, the realistic assessment of tornado occurrences indicates that these single point events occur in a **negligible** density. An average of the two extremes may yield the most likely extent rating.

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

Previous Occurrences

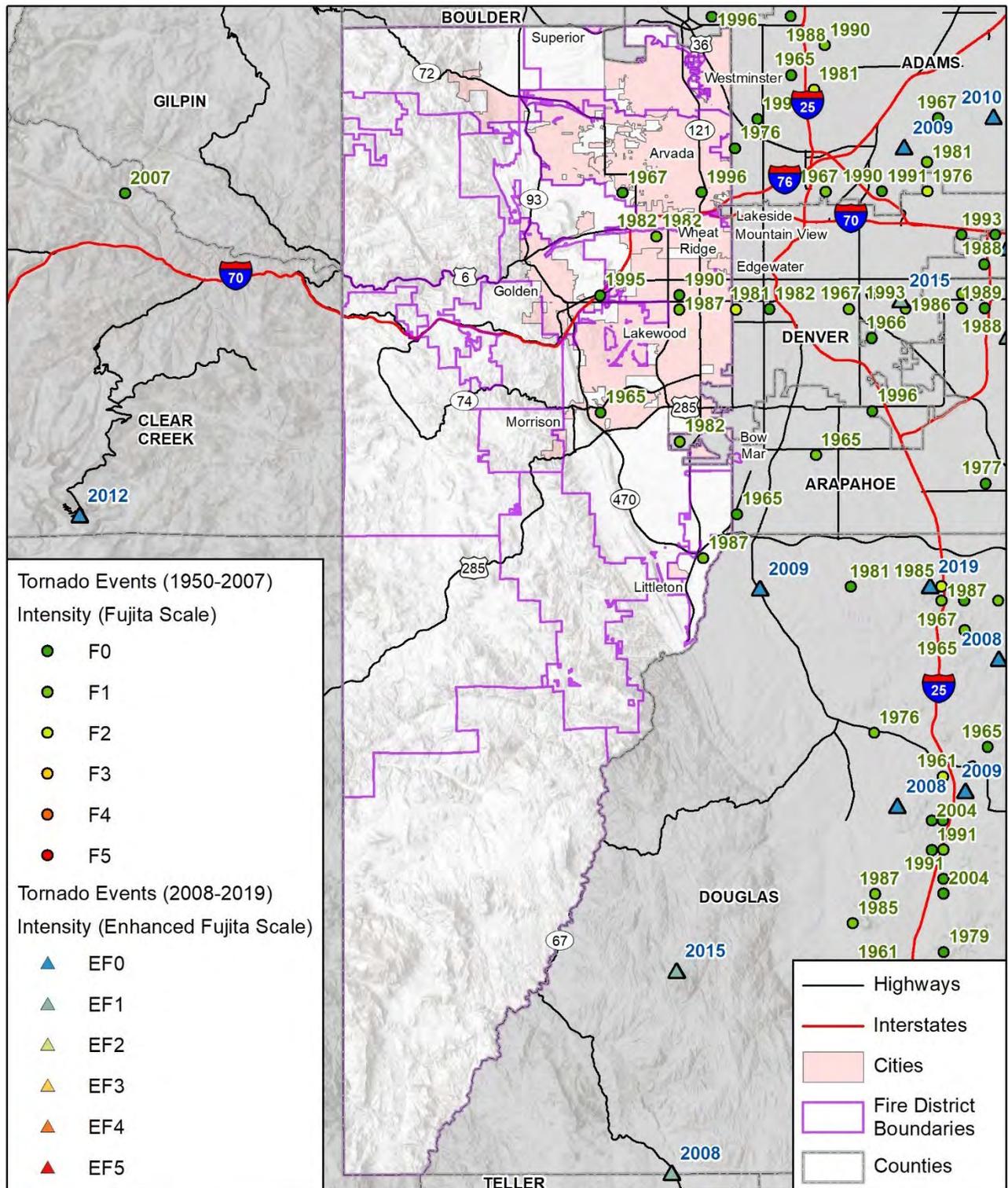
According to the NCEI database, 13 documented tornadoes have occurred in Jefferson County since 1965. The majority of the events were F0 and F1 tornadoes with unknown durations and little to no reported damages. All of the tornadoes have occurred in June and July, with no reported injuries or deaths. A map of previous tornado occurrences in Jefferson County is shown below in Figure 4-44. The following are notable tornadoes that have occurred in or near Jefferson County:

June 3, 1981 – An F2 tornado impacted Jefferson County, touching down just a few blocks east of the Jefferson County line in the City and County of Denver and tracking northeast. This tornado passed over a fairly dense residential area and crossed the US 6 Freeway, causing \$2.5 million in damages. Specific details on the duration and length of the tornado were not recorded and specifics regarding the damages were unavailable, but no deaths or injuries were reported.

June 15, 1988 – An F3 tornado touched down in Denver County. The event was reported at 200 yards wide and traveled for 3 miles, causing \$25 million in damages. While no one was killed, seven people were injured during the storm.

May 22, 2008 – An F3 tornado estimated at a mile wide at times, traveled for 39 miles across Weld County and into Larimer County, beginning just west of Greeley and extending over the community of Windsor before ending just east of Severance. One man was killed, and more than 75 injuries were reported. With damages estimated at more than \$147 million, the storm is one of the most costly disasters in Colorado history. Of special note, Jefferson County provided assistance to the affected communities.

Figure 4-44 Previous Tornado Occurrences in Jefferson County



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
NOAA, National Weather Services SVRGIS 2019

0 5 10 Miles



Probability of Future Occurrences

There have been 13 documented incidents in Jefferson County over the 55 year period since 1965. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a tornado occurring in any given year is 23.6%. This corresponds to a probability of future occurrences rating of **likely**.

Magnitude and Severity

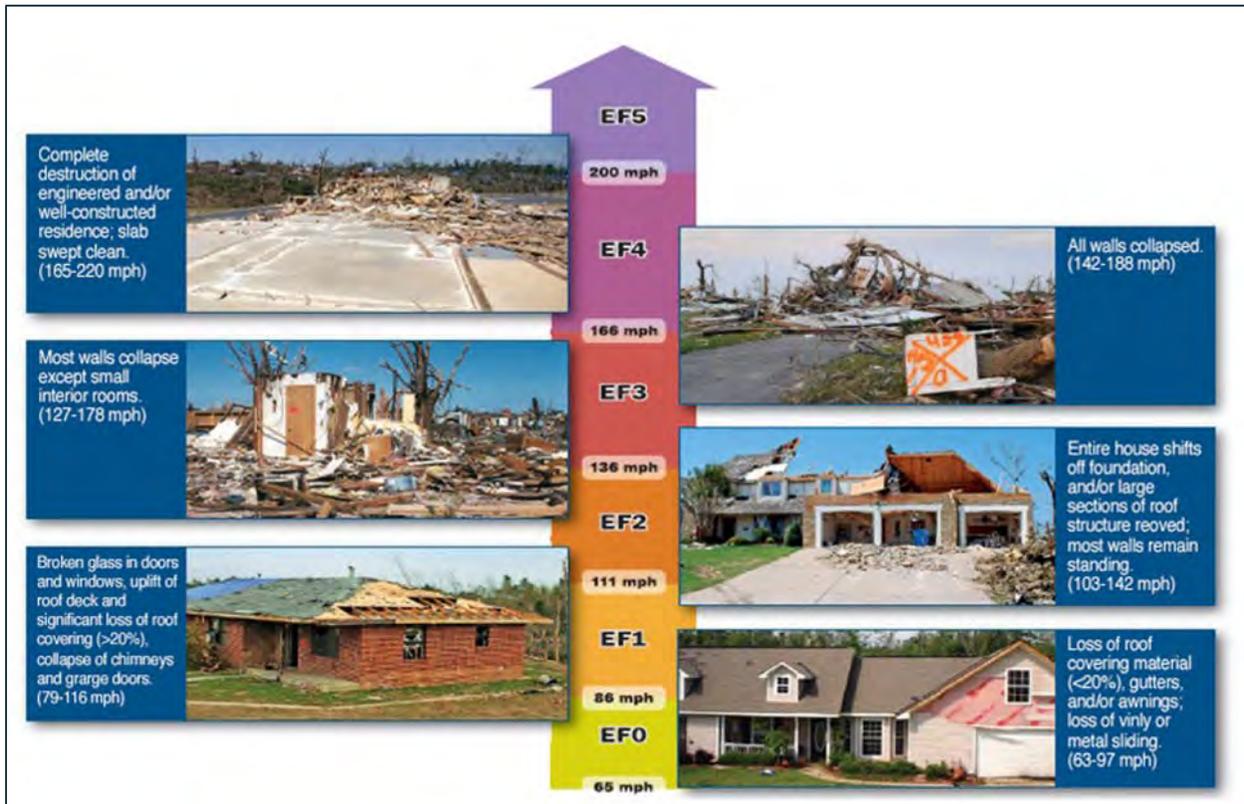
Table 4-60 shows the wind speeds associated with the Enhanced Fujita Scale ratings and the associated damage indicators associated with each rating. Visual examples of the degree of damage which could be expected with each EF rating are shown in Figure 4-45 below.

Table 4-60 Enhanced Fujita Scale with Damage Descriptions

Enhanced Fujita Scale			
Scale	Wind Speed (mph)	Relative Frequency	Potential Damage
EF0	65-85	53.5%	Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0).
EF1	86-110	31.6%	Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	10.7%	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes complete destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4%	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely levelled; cars thrown and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses levelled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration

Figure 4-45 Potential Damage Impacts from a Tornado



Source: National Oceanic and Atmospheric Administration

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. The event of record for Jefferson County is the June 3, 1981 which was an F2. The damages inflicted on critical facilities and services (critical infrastructure) resulted in no loss or disruption of services. Documented deaths and injuries were considered minimal (as none were reported) and the medical response of the County was considered non-impacted. However, \$2.5 million dollars of damage (\$7.1 million in 2020 dollars) was reported. Based on these factors, the magnitude severity rating for tornadoes is considered **limited**.

Climate Change Considerations

There presently is not enough data or research to quantify the magnitude of change that climate change may have related to tornado frequency and intensity. NASA's Earth Observatory has conducted studies which aim to understand the interaction between climate induced tornadoes. Based on these studies meteorologists are unsure why some thunderstorms generate tornadoes and others don't, beyond knowing that they require a certain type of wind shear. Tornadoes spawn from approximately one percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes rotation. Some studies show a potential for a decrease in wind shear in mid-latitude areas. Because of uncertainty of climate induced tornadoes, future updates to the mitigation plan should include the latest research on how the tornado hazard frequency and severity could change. The level of significance of this hazard should be revisited over time.

Vulnerability Assessment

All assets located in Jefferson County can be considered at risk from tornadoes although based on historic tornado paths, the risk for communities in the eastern portion is higher compared to those in western and southern portions of the county which are more mountainous. Most structures, including the

County's critical facilities, should be able to withstand and provide adequate protection from tornadoes rated up to EF4. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

General Property

General damages can be both direct and indirect. Direct damage refers to what the wind event physically destroys. Indirect damage focuses on additional costs, damages and losses from secondary hazards spawned by the event. Depending on the magnitude of the wind events as well as the size of the tornado and its path, a tornado is capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage. Mobile homes, which are most often occupied by low-income, socially vulnerable residents, are the most dangerous places during a tornado. Studies indicate that 45% of all fatalities during tornadoes occur in mobile homes, compared to 26% in traditional site-built homes (Ashley 2008).

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.

People

Community members are the most vulnerable to tornado events. Over the past 70 years there have been no deaths reported in Jefferson County due to a tornado event. During the same time period, there have been no reported injuries from tornadoes. The availability of sheltered locations such as basements, buildings constructed using tornado-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 damaging winds and tornadoes, 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 time.

Critical Facilities and Infrastructure

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Because of the unpredictability of wind events' strength and path, most critical infrastructure that is above ground is equally exposed to the storm's impacts.

Economy

Tornadoes can impact exposed critical infrastructure; depending on the impact and the function, this could cause a short-term economic disruption. The most common problems associated with tornadoes and damaging 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. Downed electrical lines following a storm can also increase the potential for lethal electrical shock and can also lead to other hazard events such as wildfires.

Historical, Cultural, and Natural Resources

Damaging winds and tornadoes can cause massive damage to the built and natural environment, uprooting trees and other debris. Historic properties listed on the National Register and the State Register throughout the county may have increased vulnerability to the wind speeds generated by a tornado.

Future Development

As the County continues to develop, the number of people and housing developments exposed to the hazard increases. Proper education on building techniques, strict adherence to building codes, and the use of sturdy building materials, basements, attached foundations, and other structural techniques may minimize the property vulnerabilities. The increased availability of accurate, real-time weather forecasting and alerts the most some protection to both residents and visitors. In some cases, the costs of future mitigation efforts, even in new future development, may outweigh the potential insurance losses; for example, Jefferson County does not generally consider shelters a cost effective mitigation effort in built environments.

Overall Hazard Significance

Historically, tornadoes in Jefferson County do not have a particularly large or frequent impact on the planning area. The geographic extent of the hazard is considered **limited**. The probability of future occurrences is considered **likely** and the magnitude/severity for the event of record is **limited**. In addition, the HMPC considers the hazard to have a **medium** overall impact rating on the County. This equates to an overall impact rating of **medium**.

4.3.16 Wildfire

Description

Wildfires are an annual concern for Jefferson County, potentially causing casualties, fatalities, and environmental damage as well as costing millions of dollars in fire suppression costs. While wildfires can occur year-round in Jefferson County, severe fires are most likely from mid-spring to late fall and are most prominent during the driest summer months of July and August. Fire conditions are impacted by hot weather, vegetation growth, and low moisture content in air and fuel. These conditions, especially when combined with high winds and years of drought, increase the potential for wildfire to occur.

Generally, there are three major factors that sustain wildfires and determine 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. 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. Manmade structures, such as homes and associated combustibles, are also potential fuel sources. 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. "Ladder fuels" are fuels low to the ground that can spread a surface fire upward through brush and into tree tops. These fires, known as crown fires, burn in the upper canopy of forests and are nearly impossible to control. The volume of available fuel is described in terms of fuel loading. Many areas in and surrounding Jefferson County are extremely vulnerable to wildfires as a result of dense vegetation combined with urban interface living.

Another important aspect to know about fuels is the condition of the types of fuels and how that will further fuel or diminish the fire behavior.

Energy Release Component (ERC) is a National Fire Danger Rating System (NFDRS) index related to how hot a fire could burn. It is related to the 24-hour potential worst case total energy (BTUs) released per unit area (square foot) within the flaming front at the head of a fire. Since wind and slope do not enter into the ERC calculation, the daily variations in ERC will be relatively small. Daily variations are due to changes in moisture content of the various fuels present, both live and dead. The ERC is a cumulative or "build-up" type of index. As live fuels cure and dead fuels dry, the ERC values get higher thus providing a good reflection of drought conditions.

1000-Hour Fuel Moisture (1000-hr FM) represents the modeled moisture content in dead fuels in the 3 to 8 inch diameter class and the layer of the forest floor about four inches below the surface. The 1000-hr FM value is based on a running seven-day computed average using length of day, daily temperature, relative humidity extremes (maximum and minimum values), and the 24-hour precipitation duration values.

100-Hour Fuel Moisture (100-hr FM) represents the modeled moisture content of dead fuels in the 1 to 3 inch diameter class. It can also be used as a very rough estimate of the average moisture content of the forest floor from three-fourths inch to four inches below the surface. The 100-hr FM value is computed using length of day, maximum and minimum temperature, relative humidity, and precipitation duration in the previous 24 hours.

Fuel Model G is used for dense conifer stands where there is a heavy accumulation of litter and downed woody material. Such stands are typically over-mature and may also be suffering insect, disease, wind, or ice damage -- natural events that create a very heavy buildup of dead material on the forest floor. The duff and litter are deep and much of the woody material is more than 3 inches in diameter. The undergrowth is variable, but shrubs are usually restricted to openings.

Examples of fuels in Jefferson County include the presence of fine fuels and needle cast combined with the cumulative effects of previous drought years, vegetation mortality, and tree mortality. Forest blowdowns, which are unexplained windfalls that blow down or break numerous trees in an area, are another example. Fuel is the only factor that can generally be addressed by human-driven mitigation.

Topography – An area's terrain and land slopes affect its susceptibility to wildfire spread. Both the fire intensity and the rate of spread increase as slope increases due to the tendency of heat from a fire to rise

via convection. The arrangement and types of vegetation throughout a hillside can also contribute to increased fire activity on slopes. In addition, topography impacts the ability of firefighters to combat the blaze by hampering access for equipment, supplies, materials and personnel.

Weather – Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfires. High temperatures and low relative humidity dry out the fuels that feed the wildfire, increasing the odds that 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 are often 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. There are no known effective measures for human mitigation of weather conditions. Careful monitoring of weather conditions that drive the activation and enforcement of fire-safety measures and programs, such as bans on open fires, are ongoing weather-related mitigation activities.

The county completed a Community Wildfire Protection Plan (CWPP) in 2012. The CWPP takes an in-depth look at the risk to the county from wildfire, along with actions to mitigate fire vulnerability and impacts. Additionally, the following communities and fire protection districts have completed CWPPs; those plans marked with an asterisk are in the process of being updated as of March 2021:

- City of Golden (2007)*
- Coal Creek Canyon Fire Protection District (2008)
- Elk Creek Fire Protection District (2005)*
- Evergreen Fire Protection District (2020)
- Fairmount Fire Protection District (2007)
- Foothills Fire Protection District (2020)
- Genesee Fire Protection District (2021)*
- Golden Gate Fire Protection District (2011)
- Indian Hills Fire Protection District (2007)*
- Inter-Canyon Fire Protection District (2007)*
- Lower North Fork Fire Protection District (2007)
- North Fork Fire Protection District (2011)
- South Platte (2007)
- West Metro Fire Protection District (2006)*

Insect Infestation

A related threat to forest health with wildfire hazard implications are insect infestations. Increased insect and disease outbreaks among trees are another outcome of the rise in drought conditions in recent decades. Insect infestations can kill trees across wide areas, leading to significant fuel buildup. Dead trees are much more susceptible to burning while the needles are still on the trees; however, once the needles fall off, live trees with needles become a greater hazard than dead needle-free trees.

The Colorado State Forest Service (CSFS) closely tracks insect infestations and their impacts of the health of Colorado forests. The following information is taken from CSFS' 2019 Report on the Health of Colorado's Forests, an extract from which is shown in Figure 4-46.

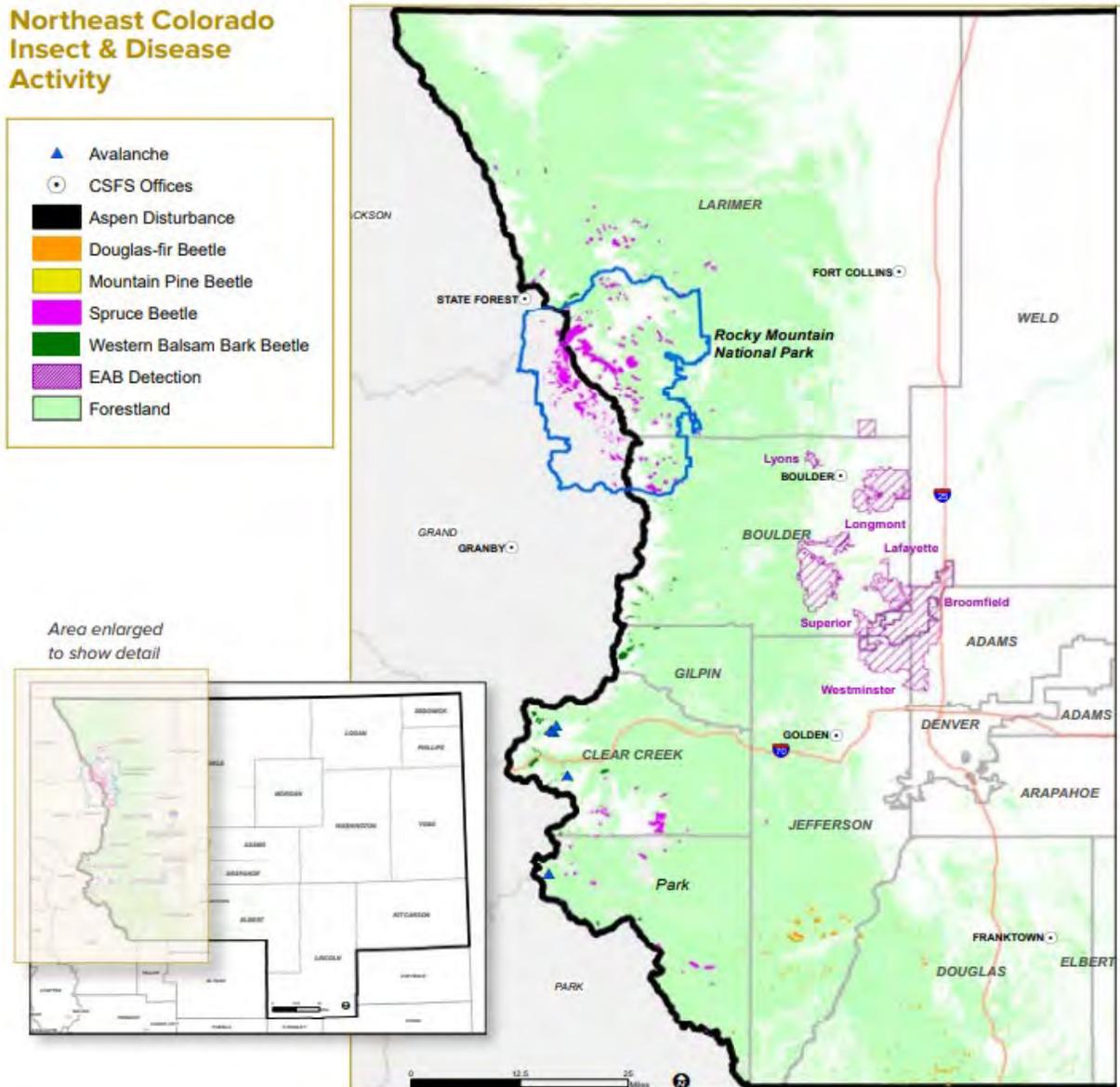
Mountain pine beetle infestations in Colorado began to increase sharply in the early 2000s, reaching a peak from 2008-2013. Infestation levels have declined significantly since then and are no longer considered a major threat in Jefferson County.

Spruce beetle infestations also started to be seen during this period, spiked in the early 2010s, and reached their peak in 2013-2015. The spruce beetle remains Colorado's most widespread and destructive insect pest, infecting 25,000 new acres statewide in 2019; while this is a significant decline from 2013-2015 when 400,000 new acres were infected each year, it remains a significant threat. While spruce beetle infestations are still significant in many surrounding counties, they are not currently a significant threat in Jefferson County.

The Douglas-fir beetle, a close relative of spruce beetle and mountain pine beetle, mainly inhabits overly-dense growths of mature Douglas-fir trees. Approximately 7,400 new acres were infected in 2019, down from 11,000 acres in 2018. As of February 2021 the Douglas-fir beetle is the most active insect threat to the forests of Jefferson County, particularly in the southern portion of the County.

Another emerging concern is the emerald ash borer, which was first detected in Boulder County in 2013, and has begun to spread outside of Boulder County, to include detections in Westminster in 2019. While a significant threat to ash trees, which make up roughly 20% of trees in Colorado’s urban communities, it is less of a threat in wildland areas.

Figure 4-46 Colorado Forest Insect and Disease Activity 2019



Source: Colorado State Forest Service 2019 Report on the Health of Colorado’s Forests

Geographic Extent

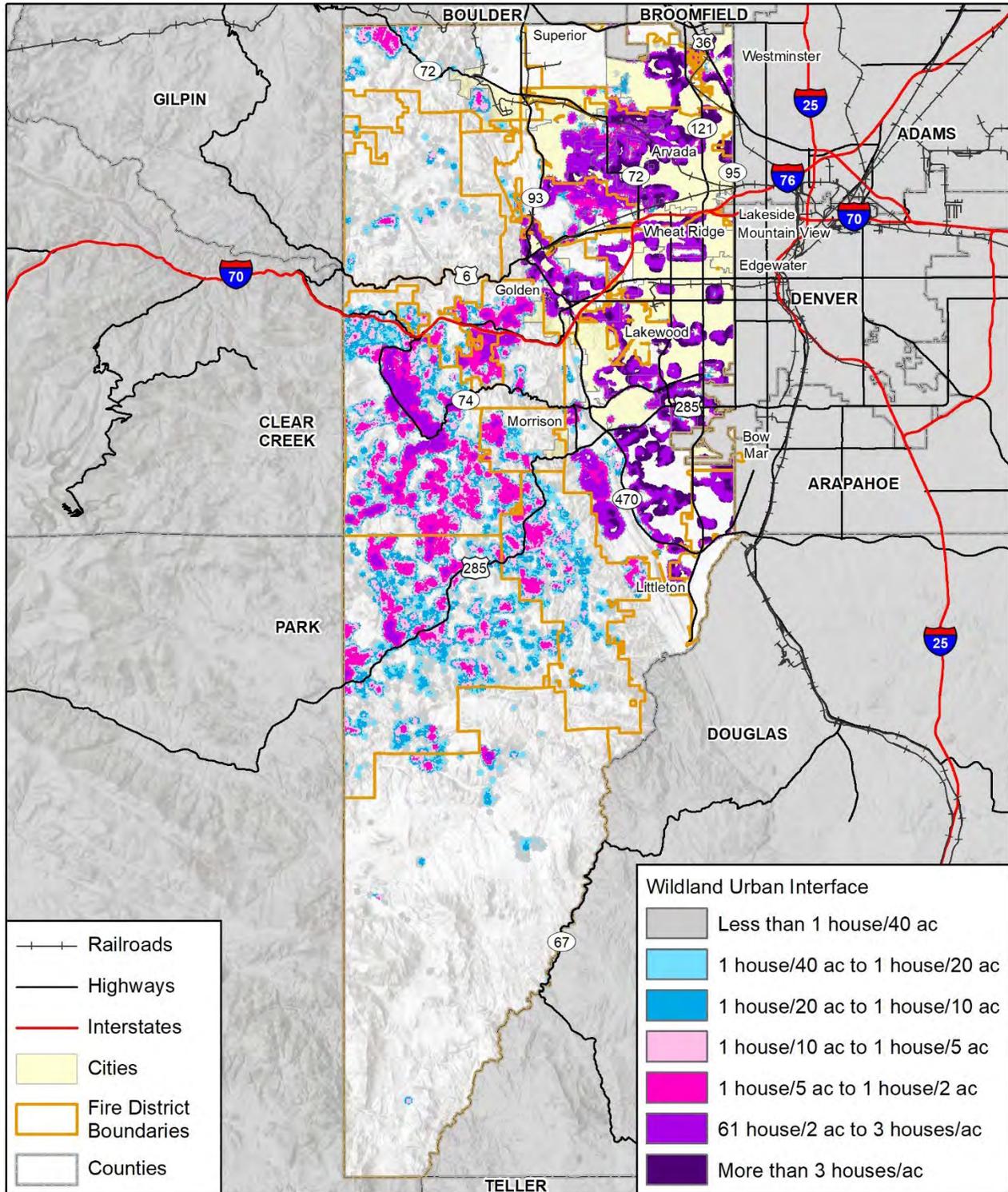
Most of the County is susceptible to wildland fires, with highest risk areas located in the Front Range foothills in western and southern Jefferson County. The Colorado Forest Atlas, formerly known as the Colorado Wildfire Risk Assessment Project (CO-WRAP) is an initiative led by the Colorado State Forest

Service to provide information to the public and wildfire professionals to identify areas in need of wildfire planning, disseminate information, encourage collaboration, plan response actions and prioritize fuels treatments in the state.

The areas of greatest concern for wildfire risk are in the wildland-urban interface (WUI), where development is interspersed or adjacent to landscapes that support wildland fire. While traditionally associated with forested mountain areas, WUI areas are also present in grasslands, prairies, valleys, or in any area where a sustained wildfire may occur and impact developed areas. Fires in the WUI may result in major losses of property and structures, threaten greater numbers of human lives, and incur larger financial costs. In addition, WUI fires may be more dangerous than wildfires that do not threaten developed areas, as firefighters may continue to work on more dangerous conditions in order to protect structures such as businesses and homes. Increased development in WUI areas puts more people and structures potentially at risk. Figure 4-47 shows WUI areas within Jefferson County as determined by the Colorado Forest Atlas. CO-WRAP defines the WUI using housing density data to delineate where people and structures meet and intermix with wildland fuels.

Based on this assessment the geographic extent is classified as **significant**. However, the impacts of major wildfires on air quality can affect much larger areas in and outside Jefferson County.

Figure 4-47 Jefferson County Wildland Urban Interface (WUI) Areas



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado Forest Atlas - Colorado State Forest Service

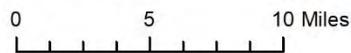
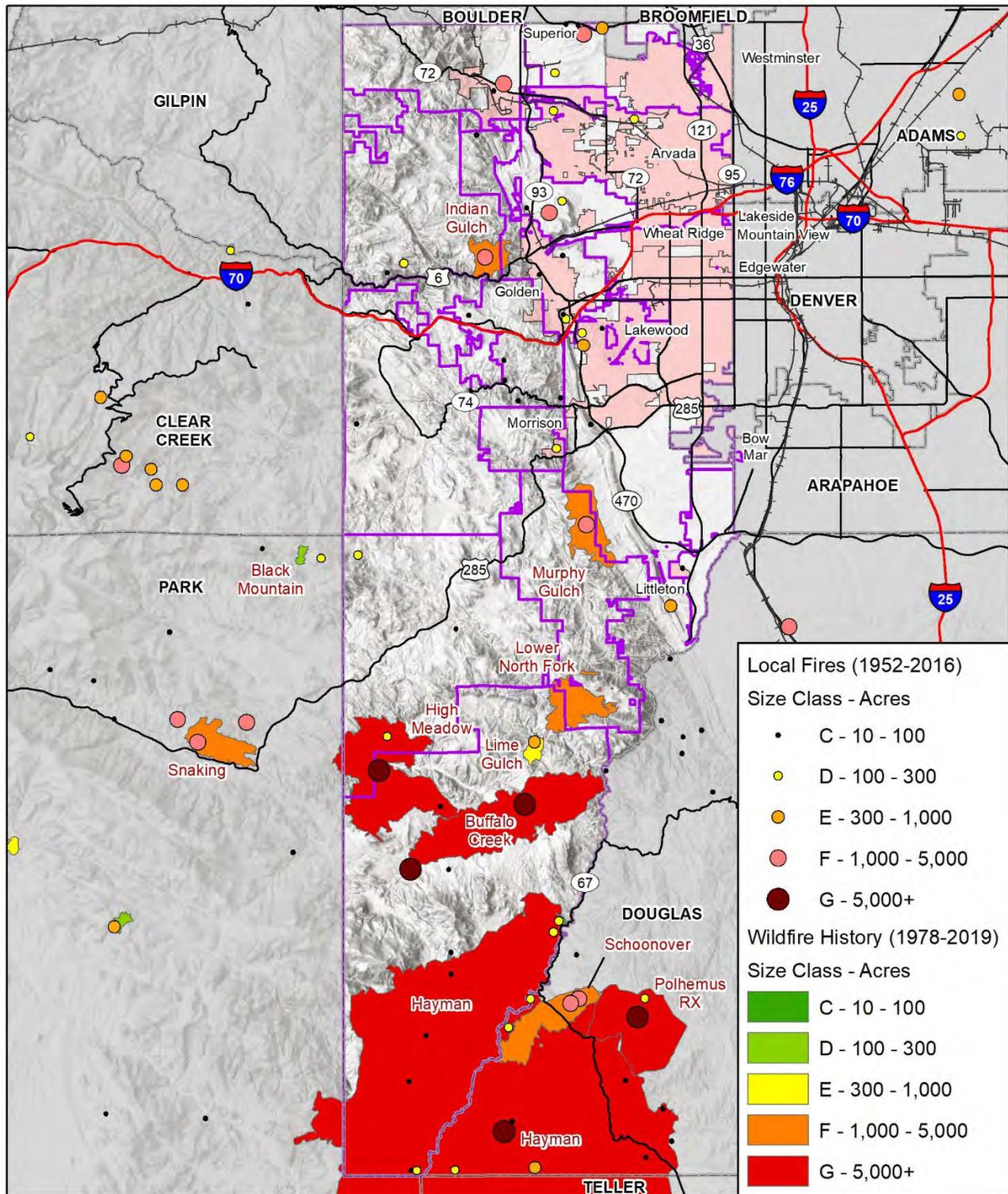


Figure 4-48 Jefferson County Historic Fires, 1952 to 2019



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado State Forest Service CO-WRAP, USGS

0 5 10 Miles



Previous Occurrences

Jefferson County has been impacted by several significant wildfire events, as shown in Figure 4-48. Particularly severe or significant events are profiled below.

September 21-24, 1978 – The Murphy Gulch fire burned approximately 3,300 acres. The first Emergency Fire Fund fire in the Front Range, several structures were lost to the blaze and many subdivisions were evacuated. Interagency resources were ordered to supplement local fire departments. The Federal Type 2 Team took over and managed the closeout. The agencies involved were the Inter-Canyon Fire Protection District (FPD) and Bancroft FPD. The fire burned along the foothills west of the Ken-Caryl Ranch subdivision.

September 7-9, 1988 – The North Table Mountain Fire burned between 1,300 and 2,000 acres. The human caused fire started off CO 93 and crossed the mountain, which threatened subdivisions on east side of mountain. Over 250 firefighters from 20 fire departments, the National Guard, and local law enforcement officers responded, in addition to a helicopter. In many areas, the focus was on structure protection and evacuation. The fire involved the Fairmount FPD as well as a helicopter. The area included the top, west, and east sides of North Table Mountain.

April 23-24, 1989 – The Mt. Falcon fire burned approximately 125 acres. The fire burned in open space properties, which lead to the voluntary fire reimbursement program by the County open space agencies to local fire departments to support the initial attack of the burn.

March 24-25, 1991 – The O'Fallon fire burned approximately 52 acres. Though small in comparison to other fires in this record, the fire occurred in the Denver Mountain Parks' open space areas, which lead to 100 firefighters from 5 different departments responding. Dry winter conditions, gusty winds, and limited access slowed the control efforts, underscoring the role of weather and terrain in fire response.

May 14-15, 1991 – The Elk Creek fire in the Golden Gate FPD burned 102 acres. The steep terrain with limited access led to the use of hand crews formed from 80+ firefighters from 15 departments and ranging across multiple counties. The fire was managed jointly by the FPDs and the Jefferson County Sheriff's Office's newly formed Incident Management Group (IMG).

July 9-11, 1994 – The Carpenter Peak/Chatfield fires each burned small amounts. The fires were caused by dry lightning, as part of a larger fire bust that sparked across the entire Front Range. These particular fires resulted in evacuations from Roxborough Park, and involved 300 firefighters, 40 engines, and National Guard helicopters.

May 18-25, 1996 – The Buffalo Creek fire burned approximately 10,400 acres. High winds caused extreme fire behavior, leading to a 10 mile run in only six hours. 10 homes or other outbuildings were lost. This fire marked the first large WUI fire in the Front Range. Costs for the fire were estimated at \$3,835,000.

June 27 – July 5, 1998 – The Beartracks fire burned 500 acres. Heavy fuel loading in roadless area and human caused fire leads to heavy initial attack and extended attack by local fire agencies along with air resources. The fire posed a threat to the Upper Bear Creek drainage area and numerous homes. The Federal Type 2 Incident Management Team (IMT) relieved the IMG on day 3 and managed to closeout.

June 12-25, 2000 – The Hi Meadow fire, caused by humans, fell under initial attack by the local FPD and burned approximately 10,800 acres. The fire 'blew up' on the same day as the 10,000 acre Bobcat fire in Larimer County, causing a Front Range-wide stress on resources. 52 homes were lost along with other miscellaneous structures. This fire was considered the "benchmark" WUI fire for Colorado until the Hayman fire in 2002. The fire burned from Burland Ranchettes on the west to Colorado Highway 126 on the east, and south to the Buffalo Creek Fire burn area and the town of Pine.

The Bobcat Fire also lasted several days and was started by a campfire, though the area had a long history of fire, included several caused by lightning. The control costs were estimated at \$3.5 million (\$4.3 in 2008) with no private losses, but the fire heavily impacted the watershed and water quality in the surrounding communities. The concurrence of the two fires is significant due to the strains caused on the regional resources and mutual aid capabilities.

2002 Fire Season

The 2002 fire season is the most severe fire season on record in the state of Colorado and in particular for Jefferson County and the Front Range communities. 2002 was one of the most severe droughts on record in Colorado. During 2002, total suppression costs for the fires exceeded \$152 million. 3,409 fires were documented during the year for a cumulative total of 244,252 burned acres. This is the highest number of fires in any year in Colorado since 1990 and accounted for more than three times as many burned acres as the next-largest recorded damages for one season. More than 16,500 firefighters responded to the events. Nine firefighters were killed during the year, and one air tanker and one helicopter were lost, killing three additional people. 384 homes were lost statewide, with an additional 624 structures lost.

Four of the fires that Jefferson County suffered during this year resulted in Fire Management Assistance Declarations: the Schoonover, Black Mountain, Snaking and Hayman fires. The first three fires burned from the end of April through the end of May, collectively, and the Hayman fire burned for more than a month. These fires are further profiled below, using information provided by the Jefferson County Office of Emergency Management and the 2008 State Hazard Mitigation Plan.

May 20-27, 2002 – Lightning sparked a wildfire near Deckers. Extremely dry conditions and very strong winds the following day allowed the fire to consume 3,860 acres before it could be contained. Thirteen structures were destroyed, including 4 homes.

April 22 – May 2, 2002 – The Snaking Fire burned approximately 3,000 acres. Caused by humans outside of the 'normal' fire season, the event was exacerbated by high winds. The initial and extended attacks were coordinated mostly through Jefferson and Park Counties, with assistance from air resources. The fire threatened numerous homes and burned north of U.S. Highway 285 from Platte Canyon High School to Crow Hill, with 2 lost structures. The NRCS Emergency Watershed Protection Program authorized \$72,883 in response and recovery funds.

May 5-11, 2002 – The Black Mountain Fire burned approximately 300 acres. While smaller than the other fires meriting emergency assistance in the County, the heavy fuel loading and steep terrain of the fire led to many difficulties in the suppression efforts. Local agencies from Jefferson and Park Counties responded along with air resources; with additional assistance from Clear Creek County, the United States Fire Service, Elk Creek FPD and the Evergreen FPD. The fire posed major threats to multiple subdivisions in Conifer and Evergreen and burned north of Conifer Mountain and south of Brook Forest. One injury was reported.

May 21-31, 2002 – The Schoonover Fire was caused by lightning and burned approximately 3,000 acres. Initially under attack by USFS and local FPDs, the fire 'blew up' on the second day to make a 3,000 acre (four mile) run in steep terrain. The fire threatened homes, camps, businesses, watersheds, regional power lines, and other structures. 12 structures and 1 bridge were lost and 2 injuries were reported. The burn area included the area immediately south across the South Platte River from Jefferson County and burned from west of Deckers to near Moonridge. The NRCS Emergency Watershed Protection Program authorized \$74,951 in response and recovery funds.

June 8 – Mid-July, 2002 – The Hayman Fire burned more than 138,000 acres. The human caused fire expanded on the second day for a historic 19-mile run and 70,000 acres. Multiple evacuations over a two-week period were required as the fire made additional 'runs' in multiple counties. Over 150 homes and structures were lost, and large areas of damage were caused to Cheeseman Reservoir and South Platte Watershed areas. The fire is considered a nationally significant WUI fire for Colorado and the Rocky Mountain region. The fire is the event of record for the planning area. Insured losses were documented at \$38.7 million and more than \$5.6 million in recovery and response funds from the NRCS Emergency Watershed Protection Program. The Forest Service spent \$38 million in suppression costs and projections for rehabilitation were estimated at \$74 million.

July 22-24, 2005 – The North Table Mountain Fire of 2005 burned significantly less land than the previous event in 1988, but threatened multiple subdivisions on all sides. The steep terrain allowed the fire to escape the initial attack. Heavy use of air resources facilitated the transition between the initial attacks to structure protection response on the first day. The fire burned the top, east, north, and west sides of Table Mountain outside of Golden and was started by kids playing with fireworks.

April 2, 2006 – Rocky Flats Fire burned 1,200 acres. The fire was started by humans and exacerbated by high winds to cause an outside of ‘normal fire season’ event. The fire moved through the open space areas of Rocky Flats NWR and the adjacent lands. The rate of spread, flame lengths, and limited access contributed to the fire threatening to cross several roads and endangered multiple subdivisions, businesses, and Rocky Mountain Airport. A multi-county approach, including Jefferson, Boulder, Gilpin, and Adams was requested. Wind conditions prevented the use of air resources. Difficulties with communications and fire management across multiple jurisdictions were documented.

July 21-23, 2006 – The Centennial Cone Fire burned in the no-man’s land adjacent to the Golden Gate FPD. The fire, which burned 22 acres, remained entirely contained within the open space park. However, the significant fire activity in steep terrain with no road access during the height of the 2006 national fire season limited the initial attack. The fire threatened U.S. Highway 6 in Clear Creek Canyon and those subdivisions. Limited air resources helped slow the spread of the fire, and an interagency “hotshot” hand crew supplemented local fire resources on the second day for a direct attack. Summer monsoons helped reduce fire danger on day three as the fire was controlled.

March 26-31, 2012 – The Lower North Fork Wildfire south of Conifer scorched a total of 4,150 acres. Strong southwest winds ahead of an approaching cold front produced high to extreme fire danger across the Front Range Foothills and Palmer Divide. As a result, a 50-acre prescribed burn that had been conducted the previous week reignited in the foothills of Jefferson County, southwest of Denver. The strong wind gusts carried embers from the interior of the burn area, across containment lines and into very dry fuels which initiated the wildfire. It then spread into the crowns of the trees and driven by the strong winds, quickly advanced to the northeast onto private lands. Local firefighters immediately responded to the wildfire, but were unable to contain it, due to the extreme winds and dry and abundant fuels. The combination of very strong winds, record warm temperatures, and extremely dry conditions for most of March all contributed to a rapid increase in fire growth during the afternoon of March 26th. A total of 900 homes were evacuated on the 26th. The fire destroyed 27 homes and resulted in the deaths of three local residents. The property damage alone was estimated to be \$11 million. The wildfire was not 100 percent contained until April 2nd.

August 15, 2019 – The Deer Creek Canyon Fire burned 25 acres, doing minimal damage but costing \$62,000 in fire suppression, incident support, and restoration.

July 14, 2020 – The Elephant Butte Fire burned 51 acres, mostly on Denver Mountain Parks land near Evergreen, resulting in a State Disaster Declaration. Fire suppression, incident support and restoration costs totaled approximately \$900,000.

October 11, 2020 – A wildfire started at Pioneer Landscaping property and burned 40+ acres extending towards the western edge of Spring Mesa subdivision with multiple homes in direct line of fire front, necessitating several evacuations. Approximately \$10,000 worth of fence was destroyed, but further loss of property was averted by mitigation efforts with the HOA and utilities prior to the event.

February 7, 2021 – A large grass fire driven by high winds and unusually dry conditions burned 446 acres near Bear Creek Lake Park and Fox Hollow Golf Course. No buildings were damaged but evacuation orders were given to residents east of the fire from Owens Lane to Kipling. The fire was suspected to be human caused.

Probability of Future Occurrences

Since 1980 there have been 23 fire incidents in Jefferson County that have burned 10 or more acres. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a severe wildfire occurring in any given year is 57.5%. This corresponds to a probability of future occurrences rating of **likely**.

Magnitude and Severity

Wildfire is a significant natural hazard in Jefferson County. The wildland-urban interface is especially at risk as decades of fire suppression have resulted in large concentrations of downed timber and fuels. This problem is exacerbated by the significant amount of residential development in the semi-urban and rural portions of the region. Potential losses from wildfire include human life; structures and other improvements; natural and cultural resources; quality and quantity of the water supply; assets such as

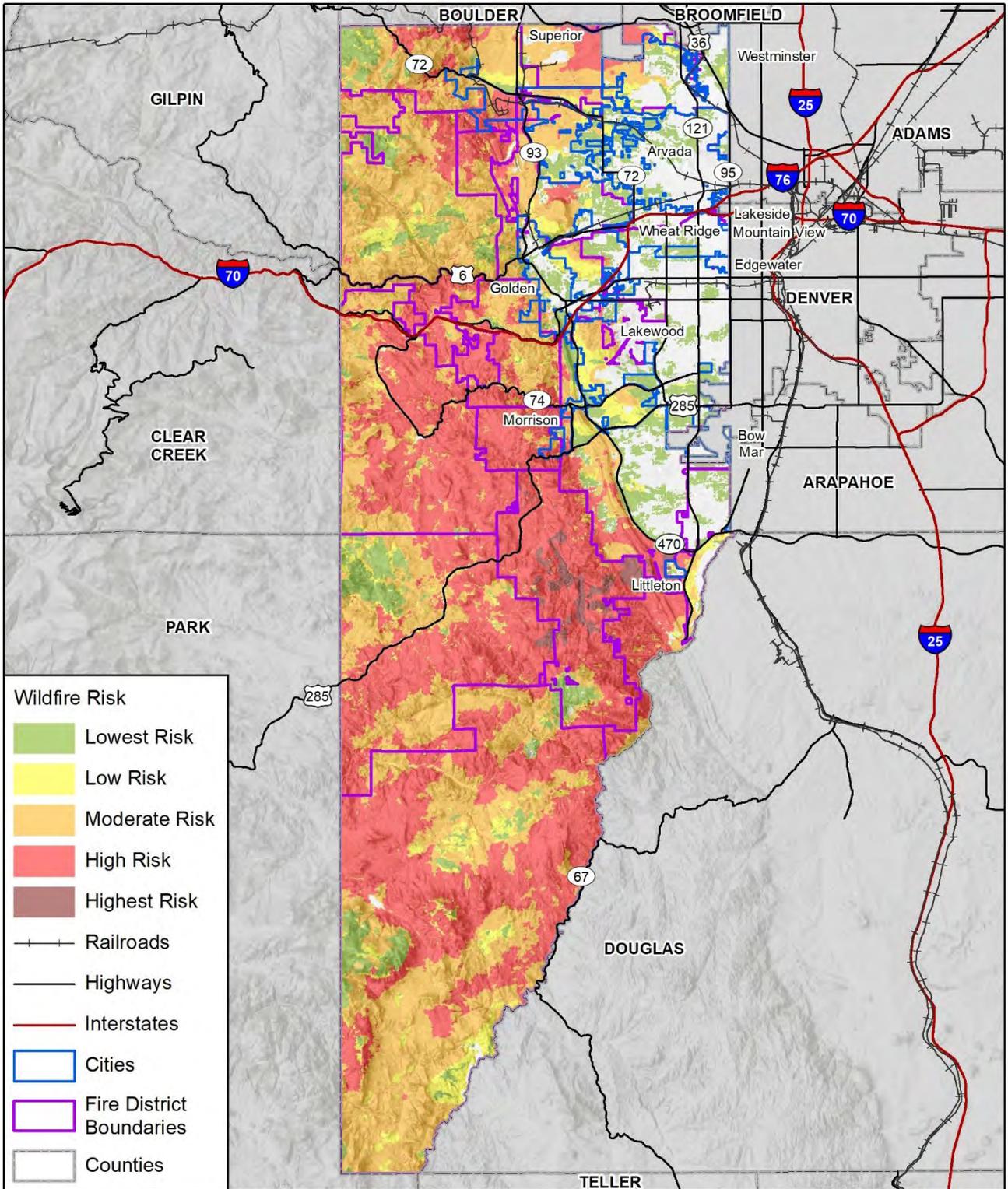
timber, range and crop land, and recreational opportunities; and economic losses. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can lead to secondary impacts or losses, such as future flooding and landslides during heavy rains.

The Colorado Forest Atlas calculates a composite risk rating, defined as the possibility of loss or harm occurring from a wildfire. It identifies areas with the greatest potential impacts from a wildfire – i.e. those areas most at risk - considering all values and assets combined together – WUI Risk, Drinking Water Risk, Forest Assets Risk and Riparian Areas Risk. This risk index has been calculated consistently for all areas in Colorado, allowing for comparison and ordination of areas across the entire state. The Wildfire Risk Classes for Jefferson County are shown in Figure 4-49.

The Colorado Forest Atlas also provides an analysis for Wildland-Urban Interface (WUI) risk based on housing density consistent with Federal Register National standards. The location of people living in the wildland-urban interface and rural areas is essential for defining potential wildfire impacts to people and homes. To calculate the WUI Risk Index, the WUI housing density data was combined with flame length data and response functions were defined to represent potential impacts. The response functions were defined by a team of experts led by Colorado State Forest Service staff. By combining flame length with the WUI housing density data, it is possible to determine where the greatest potential impact to homes and people is likely to occur. The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact. For example, areas with high housing density and high flame lengths are rated -9, while areas with low housing density and low flame lengths are rated -1. Data is modeled at a 30-meter cell resolution, which is consistent with other Colorado WRA layers. WUI Risk for Jefferson County is mapped in Figure 4-50.

The Colorado Forest Atlas also conducts a Fire Intensity Scale (FIS) analysis, which uses fuels, topography and weather as inputs to determine the relative intensity (from Class 1, lowest to Class 5, highest) of a potential wildfire. According to data from the FIS, the majority of the County has at least a moderate intensity rating with the highest potential wildfire intensity areas south of Littleton and north of the Strontia Springs Reservoir in the Pleasant Park Corridor, see Figure 4-51.

Figure 4-49 Jefferson County Wildfire Risk



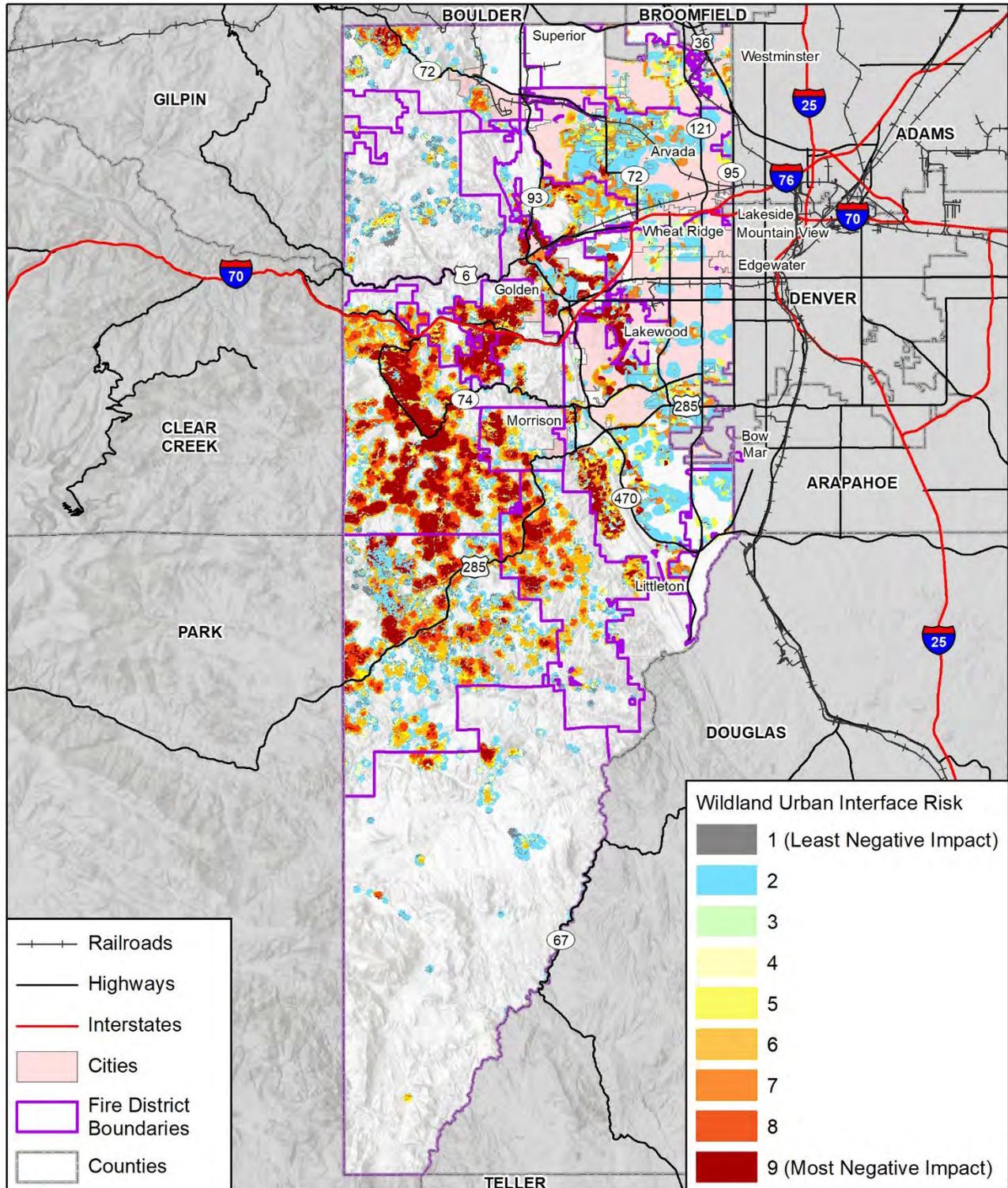
Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado State Forest Service CO-WRAP

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Figure 4-50 Jefferson County WUI Communities and WUI Risk

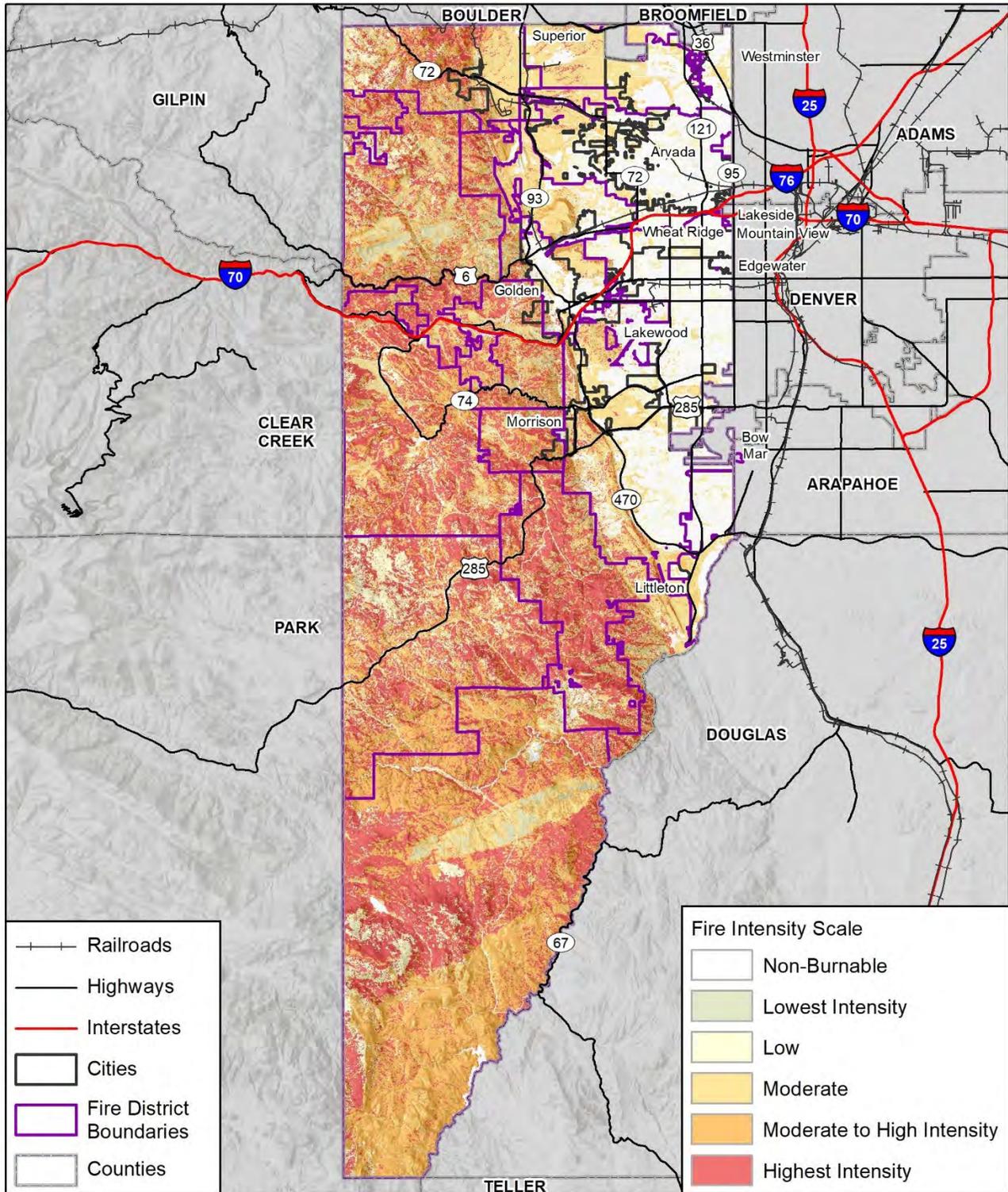


Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado Forest Atlas - Colorado State Forest Service

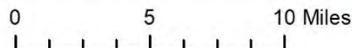
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Figure 4-51 Jefferson County Fire Intensity Scale Map



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado Forest Atlas - Colorado State Forest Service



Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. The event of record for Jefferson County is the Hayman fire, which occurred in June and July of 2002. The event damaged 41,408 acres in the County, or about one fifth of the total acres burned. 600 buildings were destroyed, 5 wildland firefighters were killed (this was an indirect result of the wildfire, as the firefighters were from Oregon and were killed in a car accident near Grand Junction) and numerous people were evacuated or displaced due to the fire. At that time, the Hayman fire is the most expensive fire in Colorado history, and took more than three weeks to contain and is considered a nationally-significant WUI fire. Based on these factors, the magnitude severity rating for wildfire is considered **critical**.

Climate Change Considerations

Climate is a major determinant of wildfire through its control of weather, as well as through its interaction with fuel availability, fuel distribution and flammability at the global, regional and local levels. With hotter temperatures, drier soil and worsening drought conditions in the County, wildfires have the potential to become more extreme. Currently humans are the main cause of fire ignition globally, although lightning has been predominantly responsible for large fires in Jefferson County. Colorado and the Western United States have seen significant increases in forest area burned in recent years, and the risk of wildfires in the future are expected to increase due to a lengthening fire season and drier conditions. According to a report from the International Panel on Climate Change:

Fire season has already lengthened by 18.7% globally between 1979 and 2013, with statistically significant increases across 25.3% but decreases only across 10.7% of Earth's land surface covered with vegetation; with even sharper changes being observed during the second half of this period. Correspondingly, the global area experiencing long fire weather season has increased by 3.1% per annum or 108.1% during 1979–2013. Fire frequencies under 2050 conditions are projected to increase by approximately 27% globally, relative to the 2000 levels, with changes in future fire meteorology playing the most important role in enhancing global wildfires, followed by land cover changes, lightning activities and land use, while changes in population density exhibit the opposite effects.

Land use, vegetation, available fuels, and weather conditions (including wind, low humidity, and lack of precipitation) are chief factors in determining the number and size of fires in Colorado each year. Generally, fires are more likely when vegetation is dry from a winter with little snow and/or a spring and summer with sparse rainfall. As a result, climate induced hazards in Colorado (specifically, a pattern of extended drought conditions) have contributed to increased concern about wildfire in Jefferson County.

The frequency, intensity, and duration of wildfires have increased across the Western United States since the 1980s. The US Department of Agriculture's "Effects of Climate Variability and Change on Forest Ecosystems" General Technical Report, published in December 2012, found that the Colorado region, among others, will face an even greater fire risk over time. The report expects Colorado to experience up to a five-fold increase in acres burned by 2050. The report's findings are consistent with previous studies on the relationship between climate change and fire risk. Colorado landscapes, including those that characterize Jefferson County, are expected to become hotter and drier as the planet warms, which in turn is expected to increase regional wildfire risk.

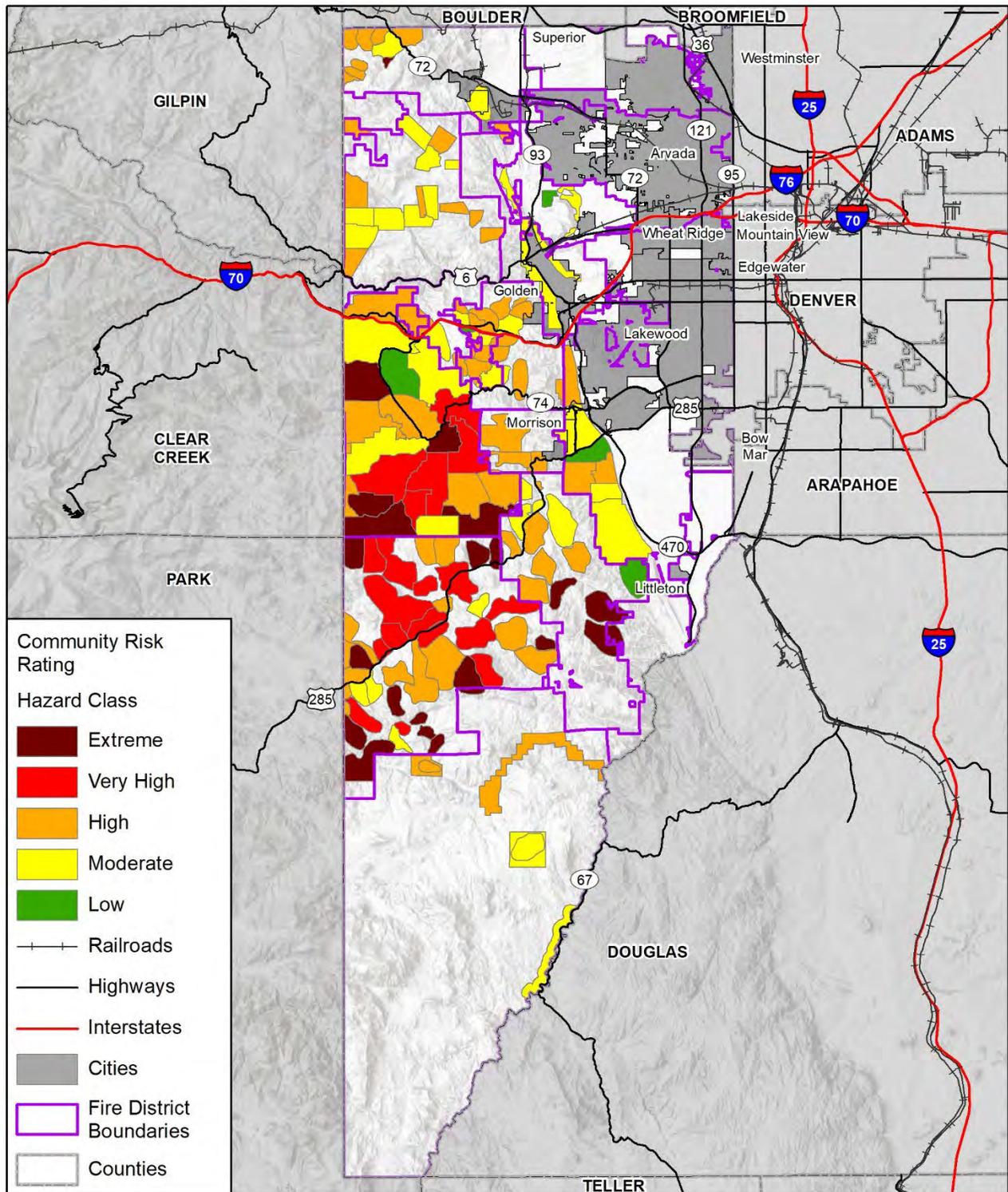
Vulnerability Assessment

Wildfire has the potential to cause widespread damage and loss of life in Jefferson County. The significance of this hazard and the availability of digital hazard data in GIS enables a more detailed vulnerability assessment than many hazards. Because the nature of the wildfire threat to the rural parts of the County is very different from the threat to the urban areas, two different analyses were conducted.

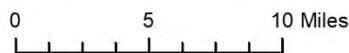
Wildfire threat and risk data was downloaded from the Colorado Forest Atlas (formerly COWRAP) and compared against Jefferson County parcel layer provided by the Assessor's Office. This provided a parcel level count of buildings, people, and critical facilities at risk in the incorporated municipalities and the unincorporated county as a whole.

A second analysis was conducted using Community Wildfire Protection Plan (CWPP) data to give a better picture of the varying wildfire risk in the unincorporated areas of the County.

Figure 4-52 Jefferson County WUI Communities and Hazard Classifications



Map compiled 4/2021; intended for planning purposes only.
 Data Source: Jefferson County, CDOT, 2011 Jefferson County CWPP, 2021 Evergreen FPD CWPP, Colorado State Forest Service



General Property

Jefferson County’s parcel and associated assessor’s data were used as the basis for the inventory of developed parcels. Parcels and their attributes, including building and contents value and occupancy type (i.e. residential, commercial, industrial) were compiled and intersected with the wildfire hazard zones defined by the Colorado Forest Atlas, from highest to lowest risk, as shown in Figure 4-49. An address point layer was used to estimate building locations. The results are displayed in Table 6-61 through 4-66.

Table 4-61 Properties at Highest Wildfire Risk

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Unincorporated	499	518	\$233,296,256	\$116,674,851	\$349,864,215	1,316
Total	499	518	\$233,296,256	\$116,674,851	\$349,864,215	1,316

Source: Colorado Forest Atlas & Jefferson County Assessor’s Office data

Table 4-62 Properties at High Wildfire Risk

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Arvada	349	350	\$156,009,447	\$78,438,745	\$234,448,192	863
Golden	16	16	\$14,685,895	\$11,878,165	\$26,564,060	27
Lakewood	31	32	\$9,570,885	\$4,795,243	\$14,366,128	70
Unincorporated	13,040	13,648	\$5,781,699,522	\$2,953,906,398	\$8,735,605,920	34,094
Total	13,436	14,046	\$5,961,965,749	\$3,049,018,551	\$9,010,984,300	35,054

Source: Colorado Forest Atlas & Jefferson County Assessor’s Office data

Table 4-63 Properties at Moderate Wildfire Risk

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Arvada	2,674	2,721	\$1,166,995,414	\$594,702,219	\$1,761,697,633	6,726
Golden	81	82	\$71,051,900	\$53,043,803	\$124,095,703	152
Lakewood	511	516	\$313,914,377	\$157,025,189	\$470,939,566	1,167
Morrison	21	22	\$7,028,841	\$3,865,949	\$10,894,790	43
Unincorporated	6,465	6,521	\$2,942,059,910	\$1,561,373,799	\$4,503,433,709	16,629
Total	9,752	9,862	\$4,501,050,442	\$2,370,010,959	\$6,871,061,401	24,717

Source: Colorado Forest Atlas & Jefferson County Assessor’s Office data

Table 4-64 Properties at Low Wildfire Risk

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Arvada	359	372	\$153,370,581	\$77,764,195	\$231,134,776	913
Golden	29	29	\$22,671,461	\$19,460,915	\$42,132,376	52
Lakewood	279	283	\$190,257,165	\$96,588,927	\$286,846,092	629
Morrison	2	2	\$179,353	\$89,677	\$269,030	4
Unincorporated	1,547	1,569	\$732,068,080	\$381,329,188	\$1,113,397,268	3,894
Total	2,216	2,255	\$1,098,546,640	\$575,232,900	\$1,673,779,540	5,491

Source: Colorado Forest Atlas & Jefferson County Assessor’s Office data

Table 4-65 Properties at Lowest Wildfire Risk

Jurisdiction	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Arvada	1,976	2,107	\$1,166,279,560	\$637,000,048	\$1,803,279,608	5,052
Golden	259	264	\$358,763,100	\$285,661,344	\$644,424,444	526
Lakewood	1,202	1,272	\$816,577,558	\$431,585,331	\$1,248,162,889	2,788
Morrison	28	28	\$10,286,039	\$5,680,512	\$15,966,551	52
Wheat Ridge	580	658	\$240,475,070	\$123,662,864	\$364,137,934	1,376
Unincorporated	5,115	5,189	\$2,459,734,233	\$1,321,375,963	\$3,781,110,196	12,679
Total	9,160	9,518	\$5,052,115,560	\$2,804,966,061	\$7,857,081,621	22,472

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Based on this analysis, there are an estimated 35,063 parcels and 36,199 structures at risk of wildfire, with a combined total value exceeding \$25.7 billion. Roughly 40% of those are in high or highest risk areas. The greatest concentration of assets at risk are in the unincorporated County, followed by the Cities of Arvada and Lakewood.

The second analysis used the Wildland Urban Interface community layer to indicate where groups of structures define a 'community' in the WUI. These communities have hazard ratings assigned during the CWPP planning process, generally based on NFPA methodologies that evaluate hazard based on types of construction, fuels, topography, and community access/egress. For the WUI analysis in this section, hazard classifications for wildland-urban communities were referenced from the corresponding local CWPPs. In a few instances the hazard classification was modified during the County CWPP process, but based on discussion with the County Wildland Fire Coordinator the preference was to use the hazard classifications originally assigned (this included fire protection districts of: Coal Creek, Elk Creek, Evergreen, Fairmount, Foothills, Genesee, Golden, Golden Gate, Indian Hills, Inter-Canyon, North Fork and West Metro). The community boundaries and hazard classifications used in the analysis are shown above in Figure 4-52. It should be noted that there are large areas within a wildfire hazard area but not a designated WUI community. These areas include portions of northern Jefferson County generally west of Highways 93 and C470, as well as all of southern Jefferson County and generally coincide with the County's Wildfire Hazard Overlay District Zone. Development within these areas was assigned an 'unrated' hazard class.

Results were sorted by risk ranking (extreme to low), and then organized by Fire Protection District (FPD). Table 4-66 through Table 4-70 display the value of structures at risk including estimated contents values, and population estimates. Based on this analysis, there are an estimated 31,130 parcels and 32,755 structures at risk of wildfire, with a combined total value exceeding \$20 billion. Roughly 70% of those are in extreme, high or very high risk areas. The greatest concentration of assets at risk are in the unincorporated County, followed by the Cities of Arvada and Lakewood.

Table 4-66 Properties within Extreme Risk CWPP Communities

Fire Protection District	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Coal Creek	35	36	\$6,984,756	\$3,492,378	\$10,477,134	92
Elk Creek	851	954	\$253,322,261	\$128,293,083	\$381,615,344	2,407
Evergreen	1,193	1,275	\$439,340,082	\$226,724,346	\$666,064,428	3,114
Inter-Canyon	148	152	\$57,079,102	\$28,566,580	\$85,645,682	383
Total	2,227	2,417	\$756,726,201	\$387,076,386	\$1,143,802,587	5,995

Source: Jefferson County Assessor's Office data and CWPPs

Table 4-67 Properties within Very High Risk CWPP Communities

Fire Protection District	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Elk Creek	2,851	2,977	\$1,099,942,690	\$578,757,220	\$1,678,699,910	7,364
Evergreen	2,195	2,354	\$835,022,339	\$429,765,139	\$1,264,787,478	5,822
Inter-Canyon	5,050	5,335	\$1,936,605,396	\$1,009,342,542	\$2,945,947,938	13,196
Total	10,096	10,666	\$3,871,570,425	\$2,017,864,900	\$5,889,435,325	26,382

Source: Jefferson County Assessor's Office data and CWPPs

Table 4-68 Properties within High Risk CWPP Communities

Fire Protection District	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Coal Creek	523	532	\$188,756,665	\$95,472,261	\$284,228,926	1,344
Elk Creek	1,097	1,135	\$402,446,646	\$209,155,550	\$611,602,196	2,731
Evergreen	3,108	3,300	\$1,330,684,459	\$715,828,362	\$2,046,512,821	7,324
Fairmount	14	14	\$6,894,984	\$3,463,620	\$10,358,604	33
Foothills	1,326	1,483	\$639,581,059	\$324,189,473	\$963,770,532	3,613
Genesee	647	648	\$324,913,152	\$162,533,987	\$487,447,139	1,645
Golden Gate	113	114	\$50,755,564	\$25,442,279	\$76,197,843	286
Indian Hills	664	736	\$237,385,751	\$124,552,947	\$361,938,698	1,826
Inter-Canyon	844	855	\$330,938,271	\$166,230,391	\$497,168,662	2,168
North Fork	316	408	\$59,282,700	\$30,211,630	\$89,494,330	1,012
West Metro	629	641	\$361,778,887	\$182,315,079	\$544,093,966	1,601
Total	9,281	9,866	3,933,418,138	\$2,039,395,577	\$5,972,813,715	23,582

Source: Jefferson County Assessor's Office data and CWPPs

Table 4-69 Properties within Moderate Risk CWPP Communities

Fire Protection District	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Coal Creek	369	374	\$129,299,391	\$65,854,900	\$195,154,291	928
Elk Creek	355	359	\$158,691,279	\$82,041,126	\$240,732,405	910
Evergreen	1,438	1,480	\$789,530,450	\$427,564,065	\$1,217,094,515	3,471
Fairmount	482	487	\$215,725,102	\$107,974,617	\$323,699,719	1,232
Foothills	374	403	\$235,286,893	\$119,116,484	\$354,403,377	992
Genesee	568	583	\$274,662,080	\$138,270,848	\$412,932,928	1,479
Golden	2,426	2,487	\$1,172,661,501	\$651,736,176	\$1,824,397,677	5,893
Golden Gate	191	196	\$90,574,892	\$45,318,795	\$135,893,687	492
Inter-Canyon	309	312	\$181,836,597	\$90,943,807	\$272,780,404	793
North Fork	84	112	\$27,096,774	\$13,842,312	\$40,939,086	281
West Metro	2,244	2,296	\$1,149,732,885	\$605,660,241	\$1,755,393,126	5,704
Total	8,840	9,089	\$4,425,097,844	\$2,348,323,368	\$6,773,421,212	22,175

Source: Jefferson County Assessor's Office data and CWPPs

Table 4-70 Properties within Low Risk CWPP Communities

Fire Protection District	Improved Parcels	Building Count	Improved Value	Content Value	Total Value	Population
Evergreen	1,506	1,548	\$805,909,137	\$435,132,407	\$1,241,041,544	3,710
Fairmount	334	335	\$148,320,246	\$74,328,744	\$222,648,990	852
Genesee	23	34	\$20,760,905	\$20,760,905	\$41,521,810	-
Inter-Canyon	140	142	\$89,126,810	\$44,563,405	\$133,690,215	362
West Metro	546	575	\$328,925,720	\$165,115,578	\$494,041,298	1,441
Total	686	717	\$418,052,530	\$209,678,983	\$627,731,513	6,365

Source: Jefferson County Assessor's Office data and CWPPs

People

Populations living in areas at risk of wildfire are shown in the above tables, and summarized by municipality in Table 4-71 and by fire protection district in Table 4-72. Population was estimated by applying American Community Survey estimated average household size by jurisdiction to the count of residential structures within the WUI hazard class zone.

While the two methodologies understandably yield slightly different results, they both estimate that 84,000 to 89,000 Jefferson County residents live in areas at risk of wildfire. This equates to roughly 15% of the County's population. This represents a significant increase since the 2016 Plan, which identified 55,230 people at risk; however, this increase may be due largely to changes in methodology.

Table 4-71 Population At-Risk to Wildfire

Jurisdiction	Lowest	Low	Moderate	High	Highest	Total
Arvada	5,052	913	6,726	863	-	13,553
Golden	526	52	152	27	-	757
Lakewood	2,788	629	1,167	70	-	4,653
Morrison	52	4	43	-	-	99
Wheat Ridge	1,376	-	-	-	-	1,376
Unincorporated	12,679	3,894	16,629	34,094	1,316	68,611
Total	22,472	5,491	24,717	35,054	1,316	89,050

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table 4-72 Population At-Risk within the CWPP Communities by Fire Protection District

Fire Protection District	Low	Moderate	High	Very High	Extreme	Total
Coal Creek	-	928	1,344	-	92	2,364
Elk Creek	-	910	2,731	7,364	2,407	13,412
Evergreen	3,710	3,471	7,324	5,822	3,114	23,440
Fairmount	852	1,232	33	-	-	2,117
Foothills	-	992	3,613	-	-	4,605
Genesee	-	1,479	1,645	-	-	3,124
Golden	-	5,893	-	-	-	5,893
Golden Gate	-	492	286	-	-	778

Fire Protection District	Low	Moderate	High	Very High	Extreme	Total
Indian Hills	-	-	1,826	-	-	1,826
Inter-Canyon	362	793	2,168	13,196	383	16,902
North Fork	-	281	1,012	-	-	1,293
West Metro	1,441	5,704	1,601	-	-	8,747
Total	6,365	22,175	23,582	26,382	5,996	84,500

Source: Jefferson County Assessor's Office data and CWPP's

Critical Facilities and Infrastructure

To estimate the potential impact of wildfires on critical facilities, the list of facilities identified in Section 4.2 was compared to the wildfire risk layers developed above. The results are shown in Table 4-73 and Table 4-74. All told, 696 critical facilities are located in areas at risk of wildfire, representing 30% of the County's critical facilities. The number at high or highest risk is 163 (7%). The lifeline category of assets with the most exposure is communications facilities; followed by energy; food, water & shelter; and hazardous materials.

Table 4-73 Critical Facilities Located in Fire Hazard Zones by Jurisdiction

Jurisdiction	Lowest	Low	Moderate	High	Highest	Total	%
Arvada	15	3	12	1	0	31	11%
Golden	14	2	5		0	21	14%
Lakewood	21	1	14		0	36	8%
Morrison	2	1	1	2	0	6	27%
Wheat Ridge	8	0	0		0	8	5%
Unincorporated	70	72	289	157	6	594	47%
Total	130	79	321	160	6	696	30%

Source: HIFLD and CERC

Table 4-74 Critical Facilities Located in Fire Hazard Zones by Lifeline Category

Lifeline	Lowest	Low	Moderate	High	Highest	Total	%
Communications	80	62	257	112	5	516	44%
Energy	1	3	8	0	0	12	27%
Food, Water, Shelter	0	1	3	3	0	7	20%
Hazardous Material	7	2	11	5	0	25	20%
Health and Medical	14	0	0	0	0	14	8%
Safety and Security	9	3	20	11	1	44	13%
Transportation	19	9	22	29	0	79	17%
TOTAL	130	80	321	160	6	697	30%

Source: HIFLD and CERC

Economy

In addition to the significant direct costs listed above, fires can extensively impact the economy of an affected area, including agricultural, recreation and tourism industries, and water resources. Businesses in affected areas can be impacted due to evacuation, lack of utility service, or through destruction of property.

Historical, Cultural, and Natural Resources

Wildfire is a consistent threat to natural resources in the County, particularly the county’s parks and forests. Fire is a natural part of forest growth cycles but can also cause cascading threats to natural resources. After wildfires, the risk of floods and debris flows increases due to the exposure of bare ground and the loss of vegetation. Secondary effects of wildfires also include erosion, landslides, introduction of invasive species, and changes in water quality. It should be noted that many of the historic and cultural resources mentioned in Table 4-9 are located in wildfire hazard areas.

Future Development

Growth in the wildland urban interface has been significant in the past 25 years in Jefferson County. Despite the known risks, these areas continue to be seen as desirable to a great many people. An analysis of the Year Built field in County Assessor’s Office data shows that from 2015 through 2020, 6,237 new structures have been built in wildfire risk areas, including 604 in areas at high or highest risk. This shows that development of primary and secondary residences in wildfire hazard areas continues. Wildfire risk to future development in these areas is tempered by the County’s land use regulations. However, lots created prior to the adoption of those regulations can still be built upon.

West Metro Fire cited concerns about growth and development occurring both within and outside of the wildland/urban interface, increasing wildfire vulnerability in those areas.

Arvada Fire Protection District cited concerns about growth on the western edge of their jurisdiction in areas that are prone to high winds and have large open areas of vegetation. If fires begin in these areas, they are highly likely to spread directly towards these developments.

The County has adopted sections of the WUI code, to include fire resistive construction requirements, mitigation standards, and road & driveway standards. However, the fire protection water supply and fire sprinkler requirements sections of the WUI Code have not been adopted. The County might wish to review the WUI code in conjunction with wildland representatives to identify additional provisions it might be beneficial to adopt. The Future Avoided Cost Explorer (FACE) developed by the Colorado Water Conservation Board provides an in-depth look at the potential economic impacts and expected annual damages from future flood, drought and wildfire events. The tool looks at three different climate scenarios (current climate conditions, 2050 future – moderately warmer climate and 2050 – severely warmer climate) as well as compares current population to low, medium and high growth population scenarios.

Table 4-75 compares the estimated annual damages for Jefferson County due to wildfires for each of the climate and population scenarios. The tool estimates current losses of \$32M annually, or \$50/person, the highest in the State. Under current climate conditions, this is anticipated to increase to \$32-33M annually based on population growth; an increasingly warmer climate could increase that to \$53-\$54 M annually.

Table 4-75 Potential Future Economic Losses from Wildfires in Jefferson County

Climate Scenarios	Population Scenarios		
	Low Growth (~653,000)	Medium Growth (~695,000)	High Growth (~740,000)
Current Conditions	Total damages: \$32 M	Total damages: \$33 M	Total damages: \$33 M
	Total damages per person: less than \$50	Total damages per person: less than \$50	Total damages per person: less than \$40
Moderate-Severely Warmer Climate by 2050	Total damages: \$53 M	Total damages: \$53-\$54 M	Total damages: \$53-\$54 M
	Total damages per person: less than \$80	Total damages per person: less than \$80	Total damages per person: less than \$70

Source: Colorado Water Conservation Board (CWCB) Future Avoided Cost Explorer: Hazards <https://cwcb.colorado.gov/FACE>

Overall Hazard Significance

Wildfires in Jefferson County are a significant concern. The geographic extent of the hazard is considered **significant**. The probability of future occurrences is considered **likely**, and the magnitude/severity for the event of record is **critical**. In addition, the HMPC considers the hazard to have a **high** impact on the County. This equates to an overall impact rating of **high**.

4.3.17 Windstorm

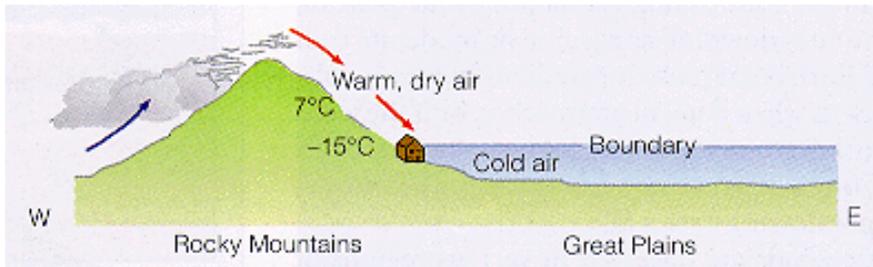
Description

High winds can occur year-round in Jefferson County. In the spring and summer, high winds often accompany severe thunderstorms. Damaging winds are typically those which exceed 60 mph. There are seven types of damaging winds:

- **Straight-line winds**—Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts**—A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts**—A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts**—A small, concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- **Gust front**—A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho**—A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word “derecho” is of Spanish origin and means “straight ahead.” Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- **Bow Echo**—A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

Straight-line winds may exacerbate existing weather conditions, such as blizzards, by increasing the effect on temperature and decreasing visibility due to the movement of particulate matters through the air, as in dust and snowstorms. High winds may also exacerbate fire conditions by drying out the ground cover, propelling fuel, such as tumbleweeds, around the region, and increasing the ferocity of existing fires. These winds may damage crops, push automobiles off roads, damage roofs and structures, and cause secondary damage due to flying debris. Shorter duration winds, such as wind gusts, can cause substantial damage to power lines. Winds with an intermediate duration, which sharply increase and last for a minute, are called squalls. Long-duration wind speeds have various names associated with their average strength, such as breeze, gale, storm, hurricane, and typhoon.

Downslope winds in Colorado are referred to as Chinook winds, after the Native American tribe of the Pacific Northwest. As shown in Figure 4-53, these downslope winds can occur with violent intensity in areas where mountains stand in the path of strong air currents. These warm and dry winds occur when the winds from the west blow across the Continental Divide and descend from the foothills and out onto the plains.

Figure 4-53 Chinook Wind Pattern

Source: University of Colorado at Boulder ATOC Weather Lab

Wind can be very dangerous. Areas of wind shear, caused by various weather phenomena, can make treacherous situations for airplanes and other flying aircraft. When winds become too strong on the ground, boats can capsize, trees can be stripped of their branches or uprooted, and man-made structures become vulnerable to damage or destruction. The NWS can issue High Wind Watch, High Wind Warning, and Wind Advisory to the public. The following are the definitions of these issuances:

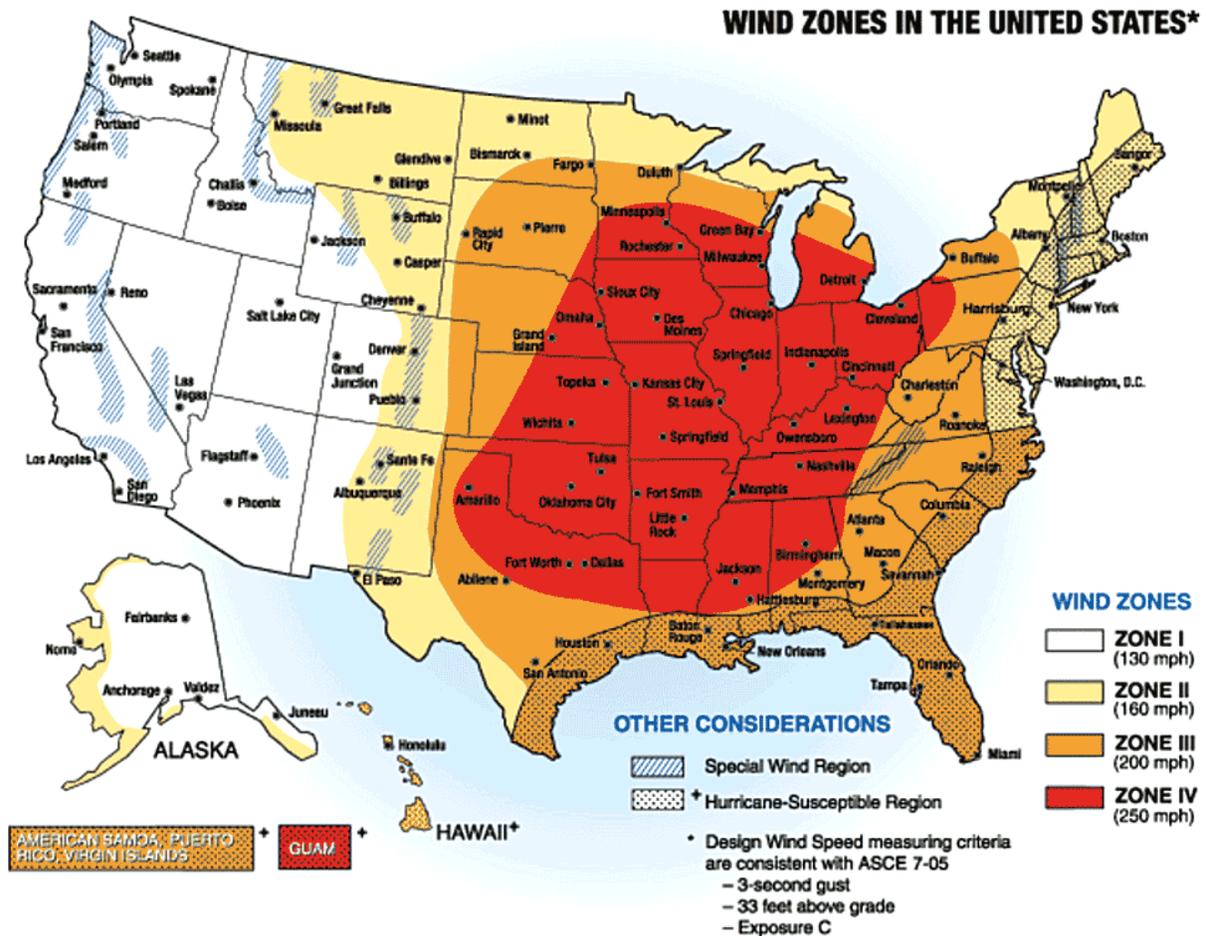
- **High Wind Watch**—This is issued when there is the potential of high wind speeds developing that may pose a hazard or are life-threatening.
- **High Wind Warning**—The 1-minute surface winds of 35 knots (40 mph) or greater lasting for one hour or longer, or winds gusting to 50 knots (58 mph) or greater, regardless of duration, that are either expected or observed over land.
- **High Wind Advisory**—This is issued when high wind speeds may pose a hazard. Sustained winds 25 to 39 mph and/or gusts to 57 mph.

Jefferson County wind patterns range from light and breezy to severe gale force winds. There is usually some level of a constant breeze due to Jefferson County's mountainous, Front Range, and plains topography.

Geographic Extent

The entire planning area is susceptible to wind, windstorms, and wind associated with other storm systems that can have negative impacts on a community. Depending on the origination of the atmospheric system, its direction of travel, and its duration, a part of the planning area can be affected or the entire County. Figure 4-54 depicts wind zones for the United States. The map shows that the majority of the County falls into Zone II which is characterized by high winds of 160 mph. Typically, however, the hazard is predicted to affect between 50% and 75% of the planning area. Based on this information, the geographic extent rating for windstorms is **significant**.

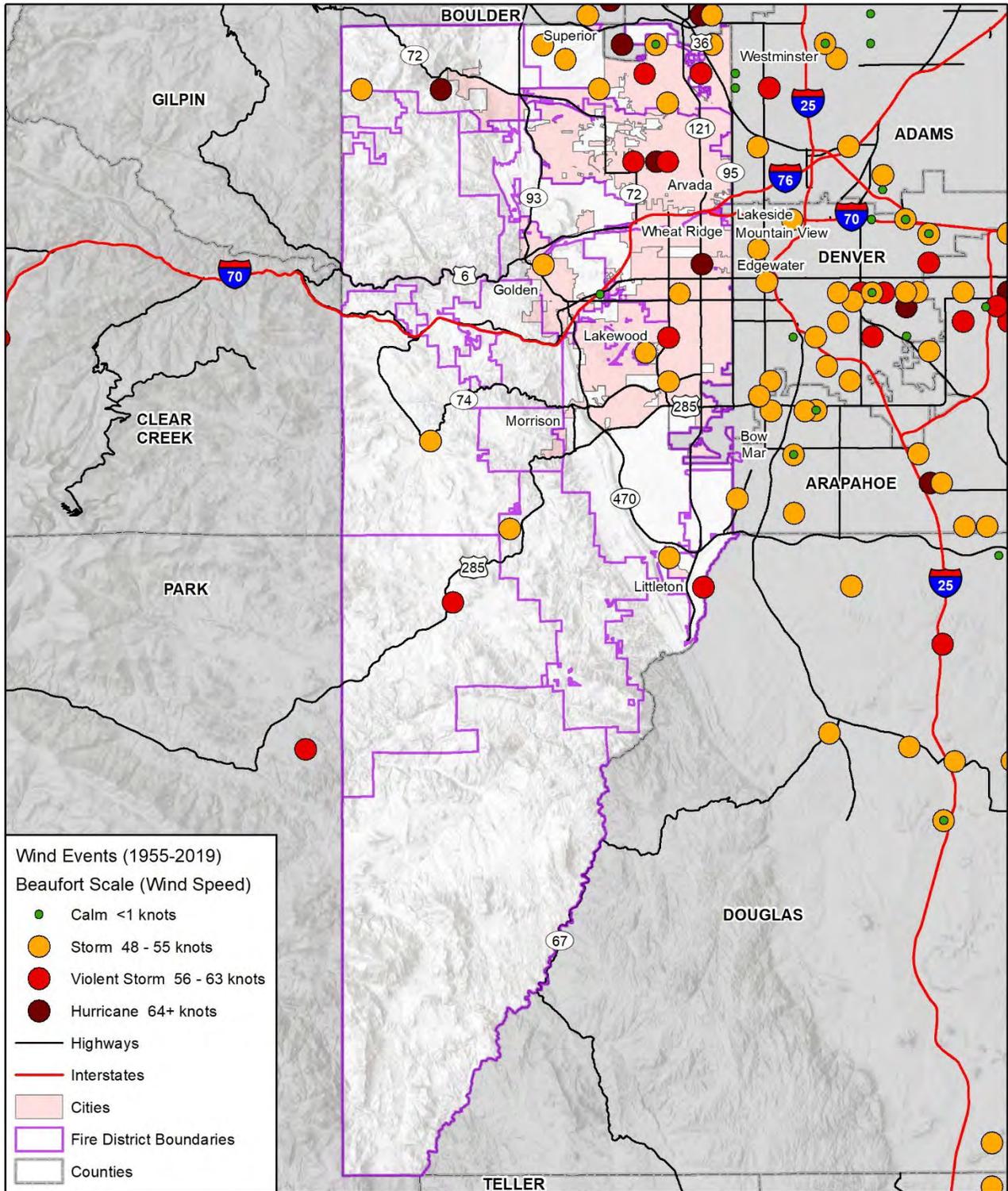
Figure 4-54 Wind Zones in the United States



Previous Occurrences

High winds associated with other severe weather and stand-alone windstorms are common occurrences in Jefferson County. The mountainous terrain and foothills topography lends itself to regular conflicts between systems of high and low pressure. Most of Colorado's most costly storms are hail-related and occurred in the Denver-metro area. Hail is usually accompanied by high winds; however the damages are not broken out to distinguish hail from wind damage. Figure 4-55 below shows recorded high wind events in Jefferson County between 1955 and 2019.

Figure 4-55 Jefferson County High Wind Events 1955-2019

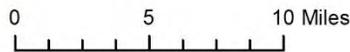


Wind Events (1955-2019)
Beaufort Scale (Wind Speed)

- Calm <1 knots
- Storm 48 - 55 knots
- Violent Storm 56 - 63 knots
- Hurricane 64+ knots

- Highways
- Interstates
- Cities
- Fire District Boundaries
- Counties

Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
NOAA, National Weather Services SVRGIS 2019



The NCEI database recorded 184 separate High Wind events between January of 2000 and December of 2020 with wind speeds over 50 knots (approximately 57 mph). The most significant of those events are recorded below.

June 14, 1976 – 78 mph winds recorded at the Jefferson County Airport near Broomfield, 66 mph at Littleton.

June 6, 1983 – Report of a thunderstorm with associated winds measured at 61 knots (70 mph).

August 15, 1982 – Report of a thunderstorm with associated winds measured at 61 knots (70 mph).

August 13, 1983 – Report of a thunderstorm with associated winds measured at 84 knots (97 mph).

June 9, 1987 – Report of a thunderstorm with associated winds measured at 63 knots (73 mph). One death reported.

April 19, 1989 – Report of a thunderstorm with associated winds measured at 68 knots (78mph).

May 16, 1990 – Report of a thunderstorm with associated winds measured at 60 knots (69 mph).

May 26, 1993 – Report of a thunderstorm with associated winds measured at 70 knots (81mph).

October 26, 1995 – Report of a thunderstorm associated winds measured at 61 knots in Coal Creek Canyon (70 mph).

June 22, 1997 – Report of a dry microburst which produced 69 mph winds at the Jefferson County Airport.

June 10, 2000 – Report of a dry microburst which produced 67 mph winds at the Jefferson County Airport.

July 30, 2004 – Report of a thunderstorm associated winds measured at 62 knots (71 mph) in Evergreen.

July 20, 2009 – Golf ball-sized hail and strong winds battered roofs, uprooted trees and pounded vehicles in Wheat Ridge, Lakewood, and Arvada, and portions of neighboring Arapahoe County. The insured losses are totaled at more than \$767.6 million in damage for Colorado's 2009 severe weather season as of August 2009.

November 12, 2011 – Hurricane force winds up to 115 mph downed trees and power lines across the Front Range Mountains and foothills. The event resulted in 4 reported injuries and several thousand residential power outages.

April 17, 2018 – A powerful damaging wind event with gusts ranging from 60 to 90 mph. Approximately 64,000 Xcel Energy customers experienced some type of outage. One woman died as a result of the event after being struck in the head by a falling tree branch.

February 10, 2020 – Strong winds blew down power lines and power poles in the Town of Morrison. No property damage was reported, but downed power lines caused several power outages that forced some school and business closures.

Probability of Future Occurrences

According to the NCEI, there have been 184 separate events with NCEI-recorded high winds above 57 mph (50 knots) in Jefferson County from January 2000 to December 2020. The methodology for calculating the probability of future occurrences is described in Section 4.3.1. This formula evaluates that the probability of a Windstorm occurring in any given year is 100%.

This corresponds to a probability of future occurrences rating of **highly likely**.

Magnitude and Severity

Damage from windstorms can be difficult to quantify. Wind, by itself, has not historically caused high insured dollar losses. For the insurance industry to track a weather event, it must be a large enough storm that insurance companies may declare it a catastrophe, and then damage estimates for auto and homeowner claims are collected and published. This generally equates to damages in excess of \$25

million, though significant events impacting small communities are also tracked occasionally. Figure 4-56 demonstrates how destructive wind can be.

Figure 4-56 July 20, 2009 Damage in Wheat Ridge



Source: Fox News Online Photo Gallery

Table 4-76 shows The Beaufort Wind Scale. The replication of the scale only reflects land-based effects.

Table 4-76 The Beaufort Wind Scale

Beaufort Number	Description	Windspeed (Knots)	Land Conditions
0	Calm	<1	Calm. Smoke rises vertically.
1	Light air	1 – 3	Wind motion visible in smoke.
2	Light breeze	4 – 6	Wind felt on exposed skin. Leaves rustle.
3	Gentle breeze	7 – 10	Leaves and smaller twigs in constant motion.
4	Moderate breeze	11 – 16	Dust and loose paper raised. Small branches begin to move.
5	Fresh breeze	17 – 21	Branches of a moderate size move. Small trees begin to sway.
6	Strong breeze	22 – 27	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over.
7	Near Gale	28 – 33	Whole trees in motion. Effort needed to walk against the wind.
8	Gale	34 – 40	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	Strong gale	41 – 47	Slight structural damage occurs; slate blows off roofs
10	Storm	48 – 55	Seldom experienced on land; trees uprooted or broken; considerable structural damage
11	Violent storm	56-63	
12	Hurricane	64+	

Source: National Oceanographic and Atmospheric Association

Table 4-77 and Table 4-78 show typical levels of damage that can be expected based on windspeed.

Table 4-77 Damage to Institutional Buildings from High Wind

Damage Description	Wind Speed Range (Expected Speed)
Threshold of visible damage	59-88 MPH (72 MPH)
Loss of roof covering (<20%)	72-109 MPH (86 MPH)

Damage Description	Wind Speed Range (Expected Speed)
Damage to penthouse roof & walls, loss of rooftop HVAC equipment	75-111 MPH (92 MPH)
Broken glass in windows or doors	78-115 MPH (95 MPH)
Uplift of lightweight roof deck & insulation, significant loss of roofing material (>20%)	95-136 MPH (114 MPH)
Façade components torn from structure	97-140 MPH (118 MPH)
Damage to curtain walls or other wall cladding	110-152 MPH (131 MPH)
Uplift of pre-cast concrete roof slabs	119-163 MPH (142 MPH)
Uplift of metal deck with concrete fill slab	118-170 MPH (146 MPH)
Collapse of some top building envelope	127-172 MPH (148 MPH)
Significant damage to building envelope	178-268 MPH (210 MPH)

Source: National Oceanographic and Atmospheric Association

Table 4-78 Damage to Electric Transmission Lines from High Wind

Damage Description	Wind Speed Range (Expected Speed)
Threshold of visible damage	70-98 MPH (83 MPH)
Broken wood cross member	80-114 MPH (99 MPH)
Wood poles leaning	85-130 MPH (108 MPH)
Broken wood poles	98-142 MPH (118 MPH)

Source: National Oceanographic and Atmospheric Association

Information from the event of record is used to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. The significant wind and windstorm events of record for Jefferson County are identified in the Previous Occurrences section of the windstorm hazard profile. Wind damage is usually identified by the number of insurance claims made as a result of a severe weather event. Wind is not broken out from a hailstorm, rainstorm, or a tornado. The damages inflicted on critical facilities and services (critical infrastructure) for Jefferson County are not specific to windstorm activity alone.

Based on these factors, the magnitude severity ratings for windstorm in Jefferson County would be **negligible**; however, if the windstorm is considered a component of the larger weather system its magnitude and severity rating would be upgraded to **limited**.

Climate Change Considerations

According to the best data available at the time of this plan update, the future impacts of climate induced severe wind events are unclear.

Vulnerability Assessment

It can be assumed that the entire planning area is exposed to some extent to high wind events. Certain areas are more exposed due to geographic location and local weather patterns. Populations living at higher elevations with large stands of trees or power lines may be more susceptible to wind damage and black out. It is not uncommon for residents living in more remote areas of the county to be isolated after such events.

General Property

All property is vulnerable during high wind events, but properties in poor condition or in particularly vulnerable locations may risk the most damage. Generally, damage is minimal and goes unreported. Property located at higher elevations and on ridges may be more prone to wind damage. Property located under or near overhead lines or near large trees may be damaged in the event of a collapse. Wind

pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift and suction forces that act to pull building components and surfaces outward. The effects of winds are magnified in the upper levels of multi-story structures. As positive and negative forces impact the building's protective envelope (doors, windows, and walls), the result can be roof or building component failures and considerable structural damage.

People

Windstorms can cause injury and death in Jefferson County. The highest risk demographic is to first responders who are dealing with emergency situations resulting from the windstorm. Those working or recreating outdoors will be susceptible to injury from wind borne debris. Winds can also be hazardous to hikers in areas of beetle or fire killed trees, which occurred when a hiker was killed by a falling tree in Rocky Mountain National Park in 2007.

Vulnerable populations also include the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. In Jefferson County, 11% of Medicare Beneficiaries rely on electricity to live independently in their homes. Isolation of these populations is a significant concern. These populations face isolation and exposure during wind events and could suffer more secondary effects of the hazard. Hikers and climbers in the area may also be more vulnerable to severe wind events.

Critical Facilities and Infrastructure

High winds can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating population, and disrupting ingress and egress. Of particular concern are roads providing access to isolated areas and to the elderly. Severe windstorms and downed trees can create serious impacts on power and above-ground communication lines. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

Economy

Economic impacts of severe wind are typically short term. These events can disrupt travel into and out of all areas of the county and create perilous conditions for residents, tourists, and nature alike.

The effect of high winds on power delivery is a relevant factor when assessing current development exposure. Xcel Energy provided data from one high wind event in 2009 when 2 days of high winds interrupted power for 67,128 customers. Xcel estimated it cost \$167,820 to repair the outage equating to a cost of roughly \$25,000 for every 10,000 customers impacted by high winds. FEMA Standard Values for Loss of Service for Utilities, located in Appendix C of the FEMA BCA Reference Guide, estimates that a power supply interruption costs the average person \$126 per day of service outage. By this estimate, this event caused \$16,916,256 in economic impacts or \$8,458,128 per day of service interruption due to high winds.

Historical, Cultural, and Natural Resources

The environment is highly exposed to high winds. Environmental impacts include the downing of trees and localized flattening of plants by high wind. Natural habitats such as streams and trees risk major damage and destruction.

Future Development

Construction sites are particularly vulnerable to windstorms. Wind-borne construction materials can become hazards to life and property. New construction designed in accordance with the Jefferson County wind load map should be able to withstand or at least resist wind damage if properly constructed. Backup power systems in critical facilities could help mitigate impacts from power outages associated with windstorms.

The ongoing development along State Highway 93 is in a region of the County that is very vulnerable to high winds. Construction sites, both residential and transportation related (the Jefferson Parkway, a multi-

lane arterial planned to connect Highway 93 to Highway 36 through Arvada) could be at risk of wind borne construction materials.

Overall Hazard Significance

Windstorms in Jefferson County can have a particular impact on the planning area. Alone they can rip roofs from houses, collapse fences, tear off siding, project flying debris through windows, and uproot large trees. When accompanying other severe weather, like hail, damages are compounded. The geographic extent of the hazard is considered **significant**. The probability of future occurrences is considered **highly likely** and the magnitude/severity for the event of record is **limited**. The HMPC considers the hazard to have an overall impact rating of **medium** on Jefferson County. Overall, the data indicates that the overall hazard significance rating is **medium**.

4.3.18 Cyber Attack

Description

The 2018 Colorado State Hazard Mitigation Plan defines cyber attacks as “deliberate exploitation of computer systems, technology-dependent enterprises, and networks.” Cyber-attacks use malicious code to alter computer operations or data. The vulnerability of computer systems to attacks is a growing concern as people and institutions become more dependent upon networked technologies. The Federal Bureau of Investigation (FBI) reports that, “cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated,” with implications for private- and public-sector networks. Cyber threats can take many forms, including:

Phishing attacks: Phishing attacks are fraudulent communications that appear to come from legitimate sources. Phishing attacks typically come through email but may come through text messages as well. Phishing may also be considered a type of social engineering meant to exploit employees into paying fake invoices, providing passwords, or sending sensitive information.

Malware attacks: Malware is malicious code that may infect a computer system. Malware typically gains a foothold when a user visits an unsafe site, downloads untrusted software, or may be downloaded in conjunction with a phishing attack. Malware can remain undetected for years and spread across an entire network.

Ransomware: Ransomware typically blocks access to a jurisdiction's/agency's/ business' data by encrypting it. Perpetrators will ask for a ransom to provide the security key and decrypt the data, although many ransomware victims never get their data back even after paying the ransom.

Distributed Denial of Service (DDoS) attack: Perhaps the most common type of cyber attack, a DDoS attack seeks to overwhelm a network and causes it to either be inaccessible or shut down. A DDoS typically uses other infected systems and internet connected devices to “request” information from a specific network or server that is not configured or powerful enough to handle the traffic.

Data breach: Hackers gaining access to large amounts of personal, sensitive, or confidential information has become increasingly common in recent years. In addition to networked systems, data breaches can occur due to the mishandling of external drives.

Critical Infrastructure/SCADA System attack: There have been recent critical infrastructure Supervisory Control and Data Acquisition (SCADA) system attacks aimed at taking down lifelines such as power plants and wastewater facilities. These attacks typically combine a form of phishing, malware, or other social engineering mechanisms to gain access to the system.

The 2018 Colorado State Hazard Mitigation Plan concludes: “This is a newly developing threat, so as more resources are devoted to countering the hazard, the risk of a disruption would hopefully decrease. Mitigation opportunities for this hazard include continued diligence of the state’s Office of Information Technology (OIT), as well as for other government and private sector entities to continue to monitor, block, and report cyber-attacks, and continually assess the vulnerability of systems.”

Geographic Extent

Cyber-attacks can and have occurred in every location regardless of geography, demographics, and security posture. Incidents may involve a single location or multiple geographic areas. A disruption can have far-reaching effects beyond the location of the targeted system; disruptions that occur far outside the state can still impact people, businesses, and institutions within the county. All the populated areas of Jefferson County are potentially susceptible to cyber-attacks, making the geographic extent **significant**.

Previous Occurrences

The cybersecurity firm Verizon DBIR reports there were a total of 3,950 data breaches worldwide in 2020, including 346 public sector systems. The number of breaches has continued to increase, and the average number of identities stolen has increased to almost one million per incident.

The Privacy Rights Clearinghouse, a nonprofit organization based in San Diego, maintains a timeline of 9,741 data breaches resulting from computer hacking incidents in the United States from 2005-2019. The database lists 47 data breaches against systems located in Colorado, totaling over 400,000 impacted

records; it is difficult to know how many of those affected Jefferson County residents. Attacks happening outside of the state can also impact local businesses, personally identifiable information, and credit card information. Table 4-79 shows several of the more significant cyber attacks in Colorado in recent years.

Table 4-79 Major Cyber Attacks Impacting Colorado, 2005-2020

Date Reported	Target	Total Records	Description
July 21, 2005	University of Colorado, Boulder	49,000	Data exposure/ personal identifiable information
August 2, 2005	University of Colorado, Denver	36,000	Data exposure/ personal identifiable information
July 17, 2007	Western Union, Greenwood Village	20,000	Credit card breach
April 22, 2014	Centura Health, Englewood	12,286	Health information breach
July 3, 2017	PVHS-ICM Employee Health and Wellness, Fort Collins	10,143	Data exposure/health information
February 2018	Colorado Department of Transportation (CDOT)	N/A	Data encryption/ ransomware
February 2019	Fort Collins Loveland Water District	Unknown	Ransomware
August 2019	Regis University	N/A	DDoS
Fall 2019	Town of Erie	N/A	Hacked email account led to \$1 million being wired to a falsified contractor's account.
November 2019	Archuleta County	N/A	Ransomware
December, 2019	Southeast Metro Storm Water Authority (SEMSWA)	N/A	Ransomware
December 2019	Aurora Water	2% of customers	Data Breach
April 2020	Rangely District Hospital	N/A	Ransomware
June 2020	Children's Hospital Colorado	2,553	Data Breach
June 2020	Colorado Information Analysis Center (CIAC)	Unknown	Data Breach
July 2020	City of Lafayette	N/A	Ransomware

Source: Privacy Rights Clearinghouse, Colorado Sun

A 2017 study found ransomware payments over a two-year period totaled more than \$16 million. Even if a victim is perfectly prepared with full offline data backups, recovery from a sophisticated ransomware attack typically costs far more than the demanded ransom. However, according to a 2016 study by Kaspersky Lab, roughly one in five ransomware victims who pay their attackers never recover their data.

Recent years have seen a major increase in ransomware attacks, particularly against local government systems, and Colorado has been no exception. In February 2018, Colorado Department of Transportation

computers were hit by ransomware; the State refused to pay the ransom and spent \$1.7 million to contain and recover lost data. In November 2019, a ransomware attack on Archuleta County resulted in a 12-day outage and severe impact to its dispatch system; attackers demanded \$300,000. Rangely District Hospital in Rangely, Colorado, fell victim to a ransomware attack that encrypted files that included patient health information in April of 2020; the hospital said it did not pay the ransom. In July 2020 the City of Lafayette had to shut down their computer network after a ransomware attack; the city reportedly paid the \$45,000 ransom.

Reports of successful attacks against SCADA systems are less common. In February 2021, a hacker gained system access to a water treatment plant in Oldsmar, Florida and increased the levels of sodium hydroxide to dangerous levels; however this change was immediately detected by plant staff and corrected.

A large, sophisticated malware attack, known as Olympic Destroyer, was launched against the 2018 Winter Olympics in PyeongChang, South Korea. The attack initially took down servers, email, Wi-Fi, and ticketing systems, which could have severely disrupted the games. Fortunately, the organizing committee had a robust cybersecurity group that was able to quickly restore most functions.

Probability of Future Occurrences

Small-scale cyber attacks such as DDoS attacks occur daily, but most have negligible impacts at the local or regional level. Data breaches are also extremely common, but again most have only minor impacts on government services.

Perhaps of greatest concern to Jefferson County are ransomware attacks, which are becoming increasingly common. It is difficult to predict the odds of Jefferson County being hit with a successful ransomware attack in any given year, but it is safe to say it is **likely** to be attacked in the coming years.

The possibility of a larger disruption affecting systems within the county is a constant threat, but it is difficult to quantify the exact probability due to such highly variable factors as the type of attack and intent of the attacker. Major attacks specifically targeting systems or infrastructure in the county cannot be ruled out.

Magnitude and Severity

There is no universally accepted scale to explain the severity of cyber-attacks. The strength of a DDoS attack is often explained in terms of a data transmission rate. One of the largest DDoS disruptions ever, the October 21, 2016 Dyn attack, peaked at 1.2 terabytes per second and impacted some of the internet's most popular sites to include Amazon, Netflix, PayPal, Twitter, and several news organizations.

Data breaches are often described in terms of the number of records or identities exposed. The largest data breach ever reported occurred in August 2013, when hackers gained access to all three billion Yahoo accounts. The hacking incidents associated with Colorado in the Privacy Rights Clearinghouse database are of a smaller scale, ranging from just 32 records to approximately 60,000, along with several cases in which an indeterminate number of records may have been stolen.

Ransomware attacks are often described in terms of the amount of ransom requested, or by the amount of time and money spent to recover from the attack. Increasingly, they can also be described in terms of services impacted, such as phone, email, websites, or even 911 services. One report from cybersecurity firm Emsisoft estimates the average successful ransomware attack costs \$81 million and can take 287 days to recover from. Overall the potential magnitude of a cyber attack can be seen as **limited** due to the lack of deaths and injuries, but the economic costs can be significant.

Climate Change Considerations

There are no known effects of climate induced impacts on human-caused hazards such as cyber attacks.

Vulnerability Assessment

The impact of a cyber-attack can vary depending on the type of attack and the intent of the malicious actor. Though a cyber disruption can have limited impacts within a system's own operations, it may cause cascading impacts.

People

Most cyber attacks do not cause injuries or fatalities, and impacts to the public are more likely to be financial losses and an inability to access systems such as public websites and permitting sites. Indirect impacts could include interruptions to traffic control systems or other infrastructure, which could result in casualties. More significantly, a ransomware attack or similar attack on a hospital or 911 system could have significant life safety impacts.

Data breaches and subsequent identity thefts can have huge impacts on the public. The Internet Crime Complaint Center (IC3) estimates that identity theft alone resulted in \$2.7 billion in losses to businesses and \$149 million in losses to individuals.

According to the Cyber & Infrastructure Security Agency (CISA), cyber risks to 9-1-1 systems can have “severe impacts, including loss of life or property; job disruption for affected network users; and financial costs for the misuse of data and subsequent resolution.” CISA also compiled a recent list of attacks on 9-1-1 systems including a DDoS in Arizona, unauthorized access with stolen credentials in Canada, a network outage in New York, and a ransomware attack in Baltimore.

General Property

The vast majority of cyber attacks affect only data and computer systems and have minimal impact on general property.

Critical Facilities and Infrastructure

While the vast majority of cyber attacks affect only data and computer systems, sophisticated attacks against utilities and infrastructure sites have occurred. Such attacks typically target the Supervisory Control and Data Acquisition (SCADA) systems of critical infrastructure, which can potentially result in system failures on a scale equal with natural disasters. Facilities and infrastructure, such as the electrical grid, could become unusable as a result of a cyber attack. A cyber attack took down the power grid in Ukraine in 2015, leaving over 230,000 people without power. Agencies that rely on electronic backup of critical files are vulnerable.

The delivery of services can be impacted since governments rely to a great extent upon electronic delivery of services. Most agencies rely on server backups, electronic backups, and remote options for Continuity of Operations/Continuity of Government. Some departments in the participating jurisdictions have the option to move to a paper method including permitting, DMV services, payments to and from the county, and payroll. However, access to documents on the network, OneDrive access, and other operations that require collaboration across the county will be significantly impacted.

Loss of government servers due to a cyber attack could affect the ability of responders to do their jobs. Cyber-attacks can interfere with emergency response communications, access to mobile data terminals, and access to critical preplans and response documents.

The delivery of services can be impacted since governments rely, to a great extent, upon electronic delivery of services. An attack could raise questions regarding the security of using electronic systems for government services.

Jefferson County Business Innovation & Technology recommends the following free actions be adopted by all participating jurisdictions, many of which have done so:

- Sign up for the MS-ISAC. <https://learn.cisecurity.org/ms-isac-registration>
- Sign up for CTIS <https://www.anomali.com/learn/isacs/ctis>
- Sign up for the DHS CISA external vulnerability scanning. Email vulnerability@cisa.dhs.gov and ncats@hq.dhs.gov
- Sign up and configure MDBR, unless an alternative solution exists. <https://www.cisecurity.org/ms-isac/services/mdbr/>
- Join the Jeffco Monthly IT meetings.
- Annually complete the NCSR. <https://www.cisecurity.org/ms-isac/services/ncsr/>

Economy

Economic impacts from a cyber attack can be debilitating. The cyber attack in 2018 that took down the City of Atlanta cost at least \$2.5 million in contractor costs and an estimated \$9.5 million additional funds to bring everything back online. The attack in Atlanta took “more than a third of the 424 software programs offline” and recovery lasted more than 6 months. The 2018 cyber attack on the Colorado Department of Transportation (CDOT) cost an estimated \$1.5 million. None of these statistics take into account the economic losses to businesses and ongoing IT configuration to mitigate from a future cyber-attack. In all, the FBI’s Internet Crime Complaint Center (IC3) reports that cybercrime have caused \$10.2B in losses from 2015-2019; 2019 alone saw \$3.5 billion in economic losses, including \$65 million in Colorado.

Historical, Cultural, and Natural Resources

The vast majority of cyber incidents have little to no impact on historic, cultural or natural resources. A major cyber terrorism attack could potentially impact the environment by triggering a release of a hazardous materials, or by causing an accident involving hazardous materials by disrupting traffic-control devices.

Future Development

Changes in development have no impact to the threat, vulnerability, and consequences of a cyber attack. Cyber attacks can and have targeted small and large jurisdictions, multi-billion dollar companies, small mom-and-pop shops, and individual citizens. The decentralized nature of the internet and data centers means that the cyber threat is shared by all, regardless of new construction and changes in development.

Overall Hazard Significance

The geographic extent of the hazard is considered **significant**. The probability of future occurrences is considered likely and the magnitude/severity for the event of record is limited. The HMPC considers the hazard to have an overall impact rating of medium on Jefferson County.

4.3.19 Pandemic

Description

A pandemic can be defined as a public health emergency that attacks a large population across great geographic distances. Pandemics are larger than epidemics in terms of geographic area and number of people affected. Epidemics tend to occur seasonally and affect much smaller areas. Pandemics, on the other hand, are most often caused by new subtypes of viruses or bacteria for which humans have little or no natural resistance. Consequently, pandemics typically result in more deaths, social disruption, and economic loss than epidemics.

There are three conditions that must be met before a pandemic begins:

1. A new virus subtype must emerge that has not previously circulated in humans (and therefore there is no pre-existing immunity),
2. This new subtype must be able to cause disease in humans, and
3. The virus must be easily transmissible from human to human.

As of January 2021, Jefferson County, the nation, and the world are dealing with the COVID-19 pandemic, confirming that pandemic is a key public health hazard in the county. This hazard risk assessment includes an analysis of pandemic risk in Jefferson County and an analysis of the impacts of the hazards profiled in this plan on public health.

A pandemic has much greater potential for loss of life and significant social disruption due to higher rates of transmission and more severe health impacts. The COVID-19 virus has a much higher rate of transmission than the seasonal flu, primarily by airborne transmission of droplets/bodily fluid. Common symptoms include fever, cough, fatigue, shortness of breath or breathing difficulties, and loss of smell and taste. While most people have mild symptoms, some people develop acute respiratory distress syndrome with roughly one in five requiring hospitalization and a fatality rate of approximately 1%. A key challenge in containing the spread has been the fact that it can be transmitted by people who are asymptomatic.

Geographic Extent

Pandemics occur not only on a county or state level, but on a national and global scale. It is likely that most communities in Jefferson County would be affected, either directly or by secondary impacts. More highly-populated areas may be affected sooner and may experience higher infection rates.

The current COVID-19 pandemic has affected all 64 Colorado counties. Jefferson County has reported 33,961 cases and 707 deaths, as of January 25, 2021. All communities in the county are likely to be impacted, either directly or indirectly. Some indirect consequences may be the diversion of resources that may be otherwise available.

Previous Occurrences

Since the early 1900s, five lethal pandemics have swept the globe:

- **1918-1919 Spanish Flu:** The Spanish Flu was the most severe pandemic in recent history. The number of deaths was estimated to be 50-100 million worldwide and 675,000 in the United States. Its primary victims were mostly young, healthy adults. At one point, more than 10 percent of the American workforce was bedridden.
- **1957-1958 Asian Flu:** The 1957 Asian Flu pandemic killed 1-2 million people worldwide, including about 70,000 people in the United States, mostly the elderly and chronically ill. Fortunately, the virus was quickly identified, and vaccine production began in May 1957.
- **1968-1969 H3N2 Hong Kong Flu:** The 1968 Hong Kong Flu pandemic killed 34,000 Americans. Again, the elderly were more severely affected. This pandemic peaked during school holidays in December, limiting student-related infections, which may have kept the number of infections down. Also, people infected by the Asian Flu ten years earlier may have gained some resistance to the new virus.
- **2009-2010 H1N1 Swine Flu:** This influenza pandemic emerged from Mexico in early 2009 and was declared a public health emergency in the U.S. on April 26. By June, approximately 18,000 cases had been reported in the U.S. and the virus had spread to 74 countries. Most cases were fairly mild, with symptoms similar to the seasonal flu, but there were cases of severe disease requiring hospitalization

and a number of deaths. The CDC estimates that 43-89 million people were infected worldwide, with an estimated 8,870 to 18,300 H1N1 related deaths, including 12,469 deaths in the United States.

- **2020-Ongoing COVID-19:** The COVID-19 or novel coronavirus pandemic began in December 2019 and was declared a pandemic in March of 2020. As of February 25, 2021, 99.4 million cases have been reported around the world with over 2 million deaths, including 28 million cases and 503,000 deaths in the US. Jefferson County has seen 33,961 cases so far resulting in 1,882 hospitalizations and 707 deaths. The pandemic is expected to last through much of 2021.

Probability of Future Occurrences

Even before the COVID-19 pandemic began, the Colorado Department of Public Health and Environment (CDPHE) considered a pandemic to be inevitable. However, there is no definite way to predict when the next pandemic might happen. Some indicators will be present, but not every new virus turns into a pandemic. Based on the five pandemics that have affected the United States in roughly the last 100 years, a pandemic occurs on average roughly every 20 years, giving it a probability of **occasional**.

Magnitude and Severity

The magnitude of a public health emergency will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. Pandemic influenza, for example, is more easily transmitted from person-to-person but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time.

Today, a much larger percentage of the world's population is clustered in cities, making them ideal breeding grounds for epidemics. Additionally, the explosive growth in air travel means the virus could literally be spread around the globe within hours. Under such conditions, there may be very little warning time. Most experts believe we will have just one to six months between the time that a dangerous new influenza strain is identified and the time that outbreaks begin to occur in the United States. Outbreaks are expected to occur simultaneously throughout much of the nation, preventing shifts in human and material resources that normally occur with other natural disasters. These and many other aspects make influenza pandemic unlike any other public health emergency or community disaster. Pandemics typically last for several months to 1-2 years, and can have **critical** or even catastrophic impacts.

The Pandemic Intervals Framework (PIF) is a six-phased approach to defining the progression of an influenza pandemic. This framework is used to guide influenza pandemic planning and provides recommendations for risk assessment, decision-making, and action. While the PIF is specifically tailored to an influenza pandemic, the intervals provide a common method to describe pandemic activity which can inform public health actions. The duration of each pandemic interval might vary depending on the characteristics of the virus and the public health response.

The six-phase approach was designed for the easy incorporation of recommendations into existing national and local preparedness and response plans. Phases 1 through 3 correlate with preparedness in the pre-pandemic interval, including capacity development and response planning activities, while Phases 4 through 6 signal the need for response and mitigation efforts during the pandemic interval.

Pre-Pandemic Interval

In nature, influenza viruses circulate continuously among animals (primarily birds). Even though such viruses might develop into pandemic viruses, in Phase 1 no viruses circulating among animals have been reported to cause infections in humans.

Phase 1 is the natural state in which influenza viruses circulate continuously among animals but do not affect humans.

In Phase 2 an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is thus considered a potential pandemic threat. Phase 2 involves cases of animal influenza that have circulated among domesticated or wild animals and have caused specific cases of infection among humans.

In Phase 3 an animal or human-animal influenza virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for

examples, when there is close contact between an infected person and an unprotected caregiver. Limited transmission under these circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic. Phase 3 represents the mutation of the animal influenza virus in humans so that it can be transmitted to other humans under certain circumstances (usually very close contact between individuals). At this point, small clusters of infection have occurred.

Pandemic Interval

Phase 4 is characterized by verified human to human transmission of the virus able to cause “community-level outbreaks.” The ability to cause sustained disease outbreaks in a community marks a significant upward shift in the risk for a pandemic. Phase 4 involves community-wide outbreaks as the virus continues to mutate and become more easily transmitted between people (for example, transmission through the air)

Phase 5 is characterized by verified human to human spread of the virus into at least two countries in one World Health Organization (WHO) region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short. Phase 5 represents human-to-human transmission of the virus in at least two countries.

Phase 6, the pandemic phase, is characterized by community-level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is underway. Phase 6 is the pandemic phase, characterized by community-level influenza outbreaks.

Climate Change Considerations

According to the best available data, the changing climate is expected to exacerbate future pandemics. Climate change will influence vector-borne disease prevalence, although the direction of the effects (increased or decreased incidence) will be location- and disease specific. The intensity and extent of certain diseases is projected to increase. Climate induced hazards threatens to increase the spread of infectious diseases because changing heat, rain, and humidity levels allow disease carrying vectors and pathogens to come into closer contact with humans. If Colorado’s climate becomes warmer, mosquito populations could swell, making the region more favorable for disease transmission. Warmer weather could also play a role in elevated seasonal deer mouse populations. Disadvantaged populations such as people with compromised health and the economically disadvantaged are expected to bear a greater burden as a result of their current reduced access to medical care and limited resources for adaptation strategies.

Additional research is needed to determine the effects of climate change on the frequency and duration of epidemics and pandemics. Ongoing efforts to reduce Colorado’s greenhouse gas emissions and adapt to a changing climate, such as the Colorado Climate Plan, may help to reduce the impacts of climate induced on pandemics.

Vulnerability Assessment

Preparing for, responding to, and recovering from a pandemic requires a strategy that includes a holistic suite of public health activities designed to lessen the impact on morbidity and mortality. These activities include education, vaccination, prophylaxis, isolation/quarantine, a robust contact tracing program, and the closure of public facilities. In addition, clear, concise communication with the public and with other agencies remains a critical component, as does the ability of the involved agencies to achieve collaboration and coordination. By their very nature, most pandemics, once started, will not be stopped until they have run their course. This course can be shortened and weakened by a number of factors, with vaccination being the most effective method for protecting the population. Pandemic plans describe strategies of preparedness, response, and recovery to attempt to decrease illnesses and deaths during the pandemic period to manageable levels (i.e., that do not overwhelm the critical infrastructures of the State), and to promote community resiliency and rapid recovery.

People

Pandemics have the ability to affect large segments of the population for long periods of time. The number of hospitalizations and deaths will depend on the virulence of the virus. Risk groups cannot be predicted with certainty; the elderly, people with underlying medical conditions, and young children are usually at higher risk, but as discussed above this is not always true for all influenza strains. People without health coverage or access to good medical care are also likely to be more adversely affected. Mental health of the public could also be impacted depending on the length of the event and public health guidance on prevention. Medications may be limited to help prevent or treat the disease. Vaccines typically take several months to years to manufacture and would likely become available in small quantities at first. It may become necessary to ration limited amounts of medications, vaccinations, and other health care supplies.

As noted under Previous Occurrences, the COVID-19 pandemic has resulted in 99.4 million cases worldwide with over 2 million deaths as of January 25, 2021. The U.S. has seen 25 million cases with 420,000 deaths, and Jefferson County specifically has seen 33,961 cases resulting in 1, 882 hospitalizations and 707 deaths. In addition to the direct impacts, the pandemic has completely disrupted life for many people. Most large gatherings have had to be cancelled, and many schools have closed. Sheltering in place and social distancing have been highly encouraged and, in some places, mandated, leaving some individuals isolated for months.

Medical staff can become overburdened with hundreds of additional cases on top of their normal workload. All other responders will be impacted in similar proportions to the general public, thereby reducing available responders. Adverse impacts are expected to be severe for unprotected personnel and uncertain for trained and protected personnel, depending on the nature of the incident.

The COVID-19 pandemic has had severe impacts on healthcare workers and other responders. The difficulty of trying to protect themselves and their families while still doing their jobs was exacerbated initially by shortages of personal protective equipment (PPE). The mental health impacts on responders and healthcare workers have not been fully quantified but are likely to have impacts for months if not years to come.

General Property

For the most part, property itself is not generally impacted by a human disease epidemic or pandemic. However, as concerns about contamination increase, property may be quarantined or destroyed as a precaution against spreading illness. Additionally, traditional sheltering facilities including homeless shelters or facilities stood up to support displaced persons due to an evacuation or other reason due to a simultaneous disaster occurring cannot be done in a congregate setting. This requires additional planning considerations or use of facilities that allow for non-congregate shelter settings which may require an approval of a request to FEMA for non-congregate sheltering, and may have an increased cost (such as the use of individual hotel rooms) as opposed to traditional congregate sheltering facilities.

Critical Facilities and Infrastructure

Hospitals and morgues will be heavily affected and may be overwhelmed. Other critical facilities and infrastructure are not directly affected by a pandemic but may have difficulty maintaining operations and maintenance activities due to a significantly decreased workforce. Schools may be forced to close.

Medical staff can become overburdened with hundreds of additional cases on top of their normal workload. All other responders will be impacted in similar proportions to the general public, thereby reducing available responders. Adverse impacts are expected to be severe for unprotected personnel and uncertain for trained and protected personnel, depending on the nature of the incident.

The COVID-19 pandemic has had severe impacts on healthcare workers and other responders. The difficulty of trying to protect themselves and their families while still doing their jobs was exacerbated initially by shortages of personal protective equipment (PPE). The mental health impacts on responders and healthcare workers have not been fully quantified but are likely to have impacts for months if not years to come.

Other responders will be impacted similarly to the general public, although the nature of their jobs may make social distancing more difficult which could potentially lead to higher infection rates, thereby reducing available responders.

Unscheduled sick leave from a large portion of the workforce could result in loss of productivity and delivery of services. Even without large numbers of infected workers, social distancing requirements and workplace closures can have a major impact on the government's ability to deliver services, as seen during the COVID-19 pandemic. As residents are quarantined due to the pandemic, as seen during the COVID-19 pandemic the demand for deliveries of essential goods will also increase.

Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective. Help from the federal government and from other states would likely be limited, as all personnel would be deployed throughout the country already. While the federal government would do what they can, communities would have to rely on their own resources for a much longer period of time as compared to other disasters. It is expected that the government will work towards a solution that will end the pandemic, typically by helping to distribute vaccines and antiviral agents. Continual public messaging and outreach is vital.

Economy

In a normal year, lost productivity due to illness costs U.S. employers an estimated \$530 billion. During a pandemic, that figure would likely be considerably high and could trigger a recession or even a depression. Local economy and finances may be adversely affected, possibly for an extended period of time. Unscheduled sick leave from a large portion of the workforce could result in millions, even billions, of dollars lost in productivity. Business restrictions due to social distancing requirements can also be significant. In a normal year, lost productivity due to illness costs U.S. employers an estimated \$530 billion. During a pandemic, that figure would likely be considerably high and could trigger a recession or even a depression.

The economic impact of the COVID-19 pandemic and associated closures has been significant, triggering a recession and high unemployment; the unemployment rate jumped for 4.4% in March of 2020 to 14.7% in April and stayed in the double-digits through most of the summer. Some studies estimate that 1 in 5 renters are at risk of eviction. The stock market suffered major losses in the early days of the pandemic. The restaurant, retail, and oil and gas industries have been particularly hard hit, with numerous businesses closing or filing for bankruptcy. And among household with children, food insecurity – defined as when a household does not have sufficient food for its members to maintain healthy and active lives and lacks the resources to obtain more food – has more than doubled from 14% in 2018 to 32% in July 2020.

Historical, Cultural, and Natural Resources

Impacts to these resources are typically minimal. However, reduced tourism during outbreaks could lead to additional economic impacts.

Future Development

Population growth and development contribute to pandemic exposure. Future development in and around Jefferson County has the potential to change how infectious diseases spread through the community and impact human health in both the short and long term. New development may increase the number of people and facilities exposed to public health hazards and greater population concentrations (often found in special needs facilities and businesses) put more people at risk. During a disease outbreak those in the immediate isolation area would have little to no warning, whereas the population further away in the dispersion path may have some time to prepare and mitigate against disease depending on the hazard, its transmission, and public notification.

Overall Hazard Significance

The geographic extent of the hazard is considered **extensive**. The probability of future occurrences is **occasional**, and the magnitude/severity for the event of record is **critical**. The HMPC considers the hazard to have an overall impact rating of **high** for Jefferson County.

5 Mitigation Strategy

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

This section describes the mitigation strategy process and mitigation action plan for the Jefferson County Hazard Mitigation Plan. 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

The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the HMPC led to the mitigation strategy and mitigation action plan for this LHMP update. As part of the plan update process, a comprehensive review and update of the mitigation strategy portion of the plan was conducted by the HMPC. As part of this process, the goals and objectives from the 2016 Plan were reviewed and reaffirmed. While the goals were not changed, some objectives were modified to better reflect current priorities. The mitigation actions from the 2016 Plan were also reviewed, assessed for progress, and evaluated for their inclusion in this plan update. Section 5.1 below identifies the updated goals and objectives of this plan; Section 5.2 details the progress on 2016 mitigation actions; Section 5.3.1 describes how new actions were identified and prioritized; and Section 5.4 summarizes the updated mitigation action plan.

5.1 Goals and Objectives

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.

Up to this point in the planning process, the Hazard Mitigation Planning Committee (HMPC) has organized resources, assessed natural hazards and risks, and documented mitigation capabilities. A profile of the County's vulnerability to natural hazards resulted from this effort, which is documented in the preceding section. The resulting goals, objectives, and mitigation actions were originally developed based on this profile in 2010 and updated in 2016 and have again been updated for 2021. The HMPC developed the updated mitigation strategy based on a series of meetings and worksheets designed to achieve a collaborative mitigation planning effort, as described further in this section.

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

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

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

To facilitate the goals update of this plan HMPC members were provided a breakdown of the list of goals from the 2016 Jefferson County Multi Hazard Multi Jurisdiction plan, along with goals and objectives from a number of related plans, including the 2018 State of Colorado Hazard Mitigation Plan. This review was

conducted to ensure the plan's mitigation strategy reflected current policies and priorities, updated risk assessment information, and was integrated with existing plans and policies. They were told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind.

The team reaffirmed the three goals from the 2016 plan, however, the language was revised slightly to include human-caused hazards. Several objectives were revised as well. These were compiled into a document which was discussed and accepted with minor revisions and consensus of the HMPC at a follow-up mitigation planning meeting.

Based upon the risk assessment review and goal setting process, the HMPC approved these goals and objectives for the 2021 plan.

Goal 1: Increase public education and awareness about natural and human-caused hazards and how to mitigate against them.

- a) Continue public outreach efforts on the hazards identified in this plan.
- b) Improve plans, procedures, and systems for public notification and warning.
- c) Provide education on hazard resistant construction techniques and create incentives for the public to mitigate hazards on their own property.
- d) Engage constituency to take personal responsibility for their own exposure and mitigation.
- e) Increase public awareness of the need for funding for disaster mitigation & preparedness.
- f) Understand the impacts of climate change on severity and frequency of hazards.

Goal 2: Reduce impacts of hazards on life, property, and the environment.

- a) Continue to manage development and placement of structures in hazard-prone areas.
- b) Protect existing property to the extent possible.
- c) Utilize the risk assessment as the basis for jurisdictional response and evacuation plans.
- d) Protect critical facilities and infrastructure to minimize loss of critical services following an event.
- e) Strongly communicate wildfire mitigation with all land use proposals and existing land uses.
- f) Continue CWPP efforts including periodic updates and implementation of wildfire mitigation including wildfire fuel breaks, wildfire safe zones and defensible space, fuels reduction and biomass use.
- g) Increase wildfire mitigation efforts specifically on public lands and open space.
- h) Reduce the economic impact to public and private entities from hazards.
- i) Enhance ability of businesses to mitigate and recover from disasters.
- j) Continue to reduce flood losses through compliance with National Flood Insurance Program, and continue to participate with Community Rating System, where applicable.
- k) Encourage measures to enable the County and jurisdictions to better withstand a multi-year drought.
- l) Improve wildfire education and training for dispatchers and emergency responders.
- m) Improve the ability of local government and the private sector to defend against and recover from cyber attacks.
- n) More systemic preparation/adaptation to reduce more chronic but widespread impacts, such as strain on the power grid and premature aging of infrastructure.
- o) Maintain and strengthen existing natural systems/ecosystems/biodiversity to improve disaster resilience.

Goal 3: Strengthen and develop partnerships in regard to mitigating hazard impacts.

- a) Promote planning efforts that foster cooperation and coordination among jurisdictions, agencies, and community aide organizations involved in hazard mitigation and response.
- b) Maximize the use of shared resources and community resilience projects to leverage funding for hazard mitigation projects between all levels of government and the private sector.
- c) Encourage coordination between mitigation efforts on public land and adjacent private properties.
- d) Develop links between emergency planning and land and water use planning.
- e) Strengthen community partnerships to enhance the ability of local government to adapt to changing climate conditions and mitigate and respond to hazard events.
- f) Create a standing multi-jurisdictional hazard mitigation committee to provide mitigation fund governance, track plan implementation, and coordinate mitigation activities throughout the County.
- g) Implement the recommendations of the Wildfire Risk Reduction Task Force 2020 report.

5.2 Progress on Previous Mitigation Actions

Jefferson County and the majority of the participating jurisdictions have been successful in implementing actions identified in the 2016 Plan. The 2016 mitigation strategy contained a total of 74 mitigation actions, 12 of which were identified as having been completed. Seven actions were deleted as being no longer relevant. These completed and deleted actions are shown in Table 5-1

Table 5-1 2016 Mitigation Actions Completed or Deleted

Jurisdiction	Mitigation Action Title	Hazard	2020 Status
Jefferson County	Massey Draw Floodplain Improvements	Flood	Completed
Jefferson County	Beer Sisters Reservoir Rehabilitation	Dam Failure and Flood	Completed
Arvada	Multi-Jurisdictional Storm Ready Program Participation	Hail, Extreme Heat, Winter Storms, Lightning, Tornado, Severe Wind	Completed
Lakewood	Revise Emergency Operations Plan (EOP) for Maple Grove Reservoir	Dam Failure	Completed
Lakewood	Lakewood Energy Assurance Plan Update	All	Completed
Lakewood	Multi-Jurisdictional Storm Ready Program Participation	Hail, Extreme Heat, Winter Storms, Lightning, Tornado, Severe Wind	Completed
Wheat Ridge	Maple Grove Dam operations plan	Flood	Completed
Wheat Ridge	NFIP/CRS/CIP/Stormwater Utility.	Dam Failure, Flood	Completed
Denver Water	Flood inundation maps.	Flood	Completed
Denver Water	Training/exercising at Foothills Treatment Plant	Wildfire	Completed
Jefferson Conservation District	Last Resort Creek and Kennedy Gulch Fuels Reduction	Wildfire	Completed
Lookout Mountain Water	Expand storage capacity at upper Beaver Brook reservoir	Drought	Completed
Jefferson County	Drake outfall	Flood	Deleted
Jefferson County	Fairmount drainage improvement program	Flood	Deleted
Edgewater	Continued Validation of Flood Response Protocol Identified in 2007 EOP through Practical Training and Exercises Design.	Flood	Deleted (not participating for 2021)
Lakewood	Burying Power Lines to Green Mountain Repeater Site	Severe Wind, Winter Storm, Tornadoes, Lightning	Deleted
Mountain View	Storm Water Drainage	Flood	Deleted (not participating for 2021)
Denver Water	Sediment removal from Strontia Springs Dam.	Dam Failure	Deleted
Jefferson Conservation District	Educate Homeowners on Wildfire Hazards and Mitigation	Wildfire	Deleted
Jefferson Conservation District	Doubleheader Ranch Hazardous Fuels Reduction	Wildfire	Deleted
Pleasant View Metro District	Flood mitigation of Lena Gulch through West Blade Park located at 16780 Mt Vernon Road.	Flood	Deleted (not participating for 2021)

Source: HMPC

While only 12 actions were reported as having been fully completed, considerable progress has been made on other actions. Many others were reported as being in progress or are already being implemented on an annual basis. Furthermore, some mitigation actions included multiple related projects. For example, while Jefferson Conservation District is shown as only having completed one action, that action actually reflects two to five wildfire projects per year, averaging 300 acres per year treated.

Some of the challenges of implementation of projects included:

- Lack of funding, including ability to provide matching funds.
- Difficulty passing benefit cost analysis required for certain FEMA grants.
- Public opposition to fire mitigation in JeffCo Open Space – specifically in Apex Open Space where there was public opposition to reducing fuel loads.
- Conflicting priorities, and intervention of major hazard events

5.2.1 Continued Compliance with NFIP

Recognizing the importance of the National Flood Insurance Program (NFIP) in mitigating flood losses, an emphasis will be placed on continued compliance with the NFIP by Jefferson County and all participating communities have been mapped for flood hazards: Arvada, Edgewater, Golden, Lakewood, Morrison, and Wheat Ridge. 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. Jefferson County and the communities of Arvada, Golden, Lakewood, Morrison, and Wheat Ridge will also continue to participate in the Community Rating System (CRS) to go above and beyond the requirements of the NFIP, and have continued to improve their CRS ratings as described in Section 2.7.4.

Additional details related to NFIP participation are discussed in Section 2.7 and in the flood vulnerability discussion in Section 4.3.9.

5.3 Identification of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4.1: Identifying Hazards was evaluated in regard to the various options for mitigation. Hazards that pose a significant threat to the community were considered the priority in the development of hazard specific mitigation measures.

The Planning Team considered the following categories of mitigation actions, as defined in FEMA’s 2013 *Local Mitigation Planning Handbook*:

- **Plans and regulations:** These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.
- **Structure and infrastructure projects:** These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
- **Natural systems protection:** These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.
- **Education and awareness:** These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.

The Planning Team also considered the following categories as defined in the Community Rating System:

- **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.

At planning meeting #3, the Planning Team was provided with handouts describing the categories and listing examples of potential mitigation actions for each category, as well as for the identified hazards. FEMA's 2013 document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* was referenced and made available for reference, along with FEMA's 2020 *Mitigation Action Portfolio*. Attendees were then asked to submit mitigation action ideas via an online poll. Action submissions included details describing how the actions will be implemented and administered, to include cost estimates, potential funding sources, and estimated timeline for completion. Each action was required to be tied to one or more of the goals and objectives.

It was not always feasible or realistic for every jurisdiction to develop mitigation actions against every identified hazard. However, actions were compared against identified hazards to ensure that the plan contains a comprehensive range of mitigation actions and projects for each of the most high risk hazards. An emphasis on new and existing buildings and infrastructure was stressed. While the Planning Team focused primarily on those hazards identified as posing the highest risk to the jurisdiction, mitigation actions were also suggested for some low priority hazards.

Similarly, while the primary focus was on developing mitigation actions in the categories described above, some jurisdictions identified actions that do not fall into one of the above categories and which may be better defined as planning or preparedness actions. Some of these actions were nonetheless included in the plan, as the jurisdiction felt they were important actions to reduce losses from future disasters even if they do not meet the strict definition of mitigation.

HMPC members considered actions that would mitigate impacts to both new and existing buildings and infrastructure. The HMPC noted that the Hazard section of the Jefferson County Comprehensive Land Use Plan and related Land Use Code is oriented towards reducing impacts to future development and will be used as the primary implementation mechanism for ongoing land use planning related to hazards. This plan works in tandem with the Land Use Plan and puts forth recommendations that will reduce losses to both new and existing infrastructure but can be viewed as having a primary focus on reducing impacts to existing buildings, populations, and infrastructure.

5.3.1 Prioritization Process

Once the new mitigation actions were identified, the HMPC members were provided with several sets of decision-making tools, including FEMA's recommended criteria, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits).

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

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining project priority (the 'economic' factor of STAPLE/E). Other criteria used to recommend what actions might be more important, more effective, or more likely to be implemented than another included:

- Does the action protect lives?
- Does the action address hazards or areas with the highest risk?
- Does the action protect critical facilities, infrastructure or community assets?
- Does the action meet multiple objectives (Multiple Objective Management)?

The above criteria were used to prioritize actions in an iterative process over the course of the plan update process. At the start of the process, participating jurisdictions were asked to validate or update the priorities of their continuing actions from the 2016 Plan. When submitting new mitigation actions, planning team members were asked to prioritize those as well. Finally, once all new and continuing actions had been collated into a draft mitigation strategy, jurisdictions were asked to verify or update the priorities of each action compared to their other actions.

5.4 Mitigation Action Plan

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

This section outlines the development of the final 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.

The total number of actions identified by each jurisdiction is summarized in Table 5-2, including those actions completed, deleted, or continued from the 2016 HMP.

Table 5-2 Mitigation Actions Summary by Jurisdiction

Jurisdiction	# of Actions in 2016 HMP	# of Actions Completed	# of Actions Deleted	# of Actions Continued	New Actions Added	# of Actions in 2021 HMP
Jefferson County	20	2	2	16	22	38
City of Arvada	6	1	0	5	11	16
City of Edgewater	3	0	1	2	3	5
City of Golden	2	0	0	2	7	9
City of Lakewood	6	3	1	2	6	8
Town of Morrison	2	0	0	2	7	9
City of Wheat Ridge	10	2	0	8	2	10
Arvada Fire Protection District	NA	NA	NA	NA	2	2
Elk Creek Fire Protection District	NA	NA	NA	NA	2	2
Evergreen Fire Rescue	2	0	0	2	2	4
Fairmount Fire Rescue	2	0	0	2	2	4
Foothills Fire Protection District	NA	NA	NA	NA	2	2
Genesee Fire Protection District	NA	NA	NA	NA	1	1
Golden Gate Fire	2	0	0	2	1	3
Indian Hills Fire Protection District	1	0	0	1	1	2
Inter-Canyon Fire Protection District	NA	NA	NA	NA	1	1
North Fork Fire Protection District	2	0	0	2	1	3
West Metro Fire Protection District	1	0	0	1	1	2
Denver Water	6	2	1	3	1	4

Jurisdiction	# of Actions in 2016 HMP	# of Actions Completed	# of Actions Deleted	# of Actions Continued	New Actions Added	# of Actions in 2021 HMP
Lookout Mountain Water District	6	1	0	5	6	11
Jefferson Conservation District	3	1	2	0	1	1
Total	74	12	7	55	82	137

Source: HMPC

The 2021 Jefferson County mitigation action plan lists the actions developed and prioritized as described above, to include continuing actions from the 2016 Plan. The action plan details how the participating jurisdictions will reduce the vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. The action plan summarizes who is responsible for implementing each of the prioritized actions as well as when and how the actions will be implemented. All actions are tied to specific goals and objectives to ensure alignment with the Plan’s overall mitigation strategy. Additionally, projects were tied to specific infrastructure Lifeline categories, to better align with the latest FEMA guidance and grant requirements. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan’s goals.

Many of these mitigation actions are intended to reduce impacts to existing development. In addition actions are identified to reduce impacts to future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

- COM: Communications
- ENG: Energy
- FWS: Food, Water, Sheltering
- HAZ: Hazardous Waste
- H&M: Health & Medical
- S&S: Safety & Security
- TRN: Transportation

Jefferson County’s mitigation actions are listed in Table 5-3 below. Mitigation actions for the other participating jurisdictions are summarized in Table 5-2 above and detailed in each jurisdiction’s Annex.

Table 5-3 Jefferson County Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 1	Major drainageway culvert improvements with Mile High Flood District. Multiple locations of roadway crossings with significantly undersized culverts to be replaced with culverts to accommodate the 100 year flood flows. Benefits include reduced flood losses safety for emergency vehicles and the public during major flood events.	Flood	Goals 2,3; Lifelines S&S, TRN	Jefferson County Transportation and Engineering in conjunction with the Mile High Flood District	\$9,000,000; MHFD	Medium	Design phase in 2016-2019 & proposed construction in 2018-2021	Annual Implementation. Structures identified and replaced yearly
Jefferson County 2	Minor culvert improvements. Multiple locations of roadways with existing culvert crossings either failing or in eminent danger of failure. Benefits include reduced flood losses and provide for public safety	Flood	Goals 2; Lifelines S&S, TRN	Jefferson County Transportation and Engineering, Jefferson County Road and Bridge	\$1,000,000 per year County General Fund	High	Continuing, with culvert inspection and replacement ongoing.	Annual Implementation. Structures identified and replaced yearly
Jefferson County 3	Weaver Creek major drainageway master plan and FHAD. The Weaver Creek Drainageway has many areas in which the existing channel and culverts lack the capacity to safely convey the major flood events. A Master Plan is needed to properly plan and budget for needed improvements. The current Flood Hazard Area Delineation was prepared over 35 years ago and needs to be updated to accurately reflect the regulatory 100 year floodplain. Benefits include reduced flood losses.	Flood	Goals 2,3; Lifelines S&S, TRN	Jefferson County Transportation and Engineering in conjunction with the Mile High Flood District and the City of Lakewood	\$250,000 Mile High Flood District, \$150,000, County \$93,000, City of Lakewood \$7,000	Medium	Ongoing	In Progress. Master Plan complete. FHAD nearing completion.
Jefferson County 4	Notification polygons for dam failure and flash flooding. Develop pre-established notification polygons or equivalent for citizens who reside in dam failure hazard areas. Can also be established for floodplains. The technology currently exists in the CodeRED system employed by all county 911 entities. The project will require taking the dam inundation maps and floodplain	Dam Failure; Flood	Goals 1,2; Lifelines COM, FWS, H&M, S&S	Jefferson County Emergency Communication Authority (JCECA); Dam owners, floodplain managers, Mile	Minimal, need in-kind labor In-kind	High	Ongoing	In Progress. Jefferson County SO and County staff time; dams are done. Flood polygons are incomplete but JCOS GIS created a tool to build them

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	maps for the targeted areas and creating a polygon in the CodeRED system. Benefits include Faster notification will give citizens more time to evacuate from flood-prone areas which could prevent injury or death from flooding.			High Flood District				
Jefferson County 5	Update CWPPs to reflect changing conditions and new development. This project will update Community Wildfire Protection Plans (CWPPs) to reflect changing conditions and new development. Most plans were crafted in 2010 and with new development and changing conditions the accuracy of the data is questionable. Implementation would most likely require the hiring of a specific consulting firm to gather data and create new plans. Benefits include Better data will ultimately lead to better mitigation activities, better planning, and ultimately a more effective response.	Wildfire	Goals 2,3; Lifelines COM, ENG, FWS, S&S, TRN	Jefferson County OEM	To be determined based on community size, but approximately \$15-40k per plan Grant funding – state and federal	High	Ongoing	Finalize. The FMO will use the updated AOP, HMP, and fire district CWPPs to update the county CWPP
Jefferson County 6	Mitigate wildfire hazards on public lands and open space properties. There are fuel load concerns on County and other open space properties. Residential and other development are potentially at risk due to extensive WUI. This project will perform hazard fuel mitigation in areas identified as high-hazard in countywide and individual CWPPs. Different methods might include tree thinning, mastication, and controlled burning. Benefits include reduced wildfire losses	Wildfire	Goals 2; Lifelines COM, ENG, S&S	Jefferson County OEM and Open Space. ID other partners - USFS, State, FPDs, JeffCo Conservation District, Denver Mountain Parks, municipalities etc.	Varies depending on the fuel type and acreage. \$2,000 per acre is a good estimate. Grant funding – state and federal	High	Ongoing	In Progress. Utilized seasonal fuels crew when Sheriff's Office still held those positions. Jeffco Forest Health Plan IDs fire mitigation strategies, BRIC grant to build capacity for fire mitigation

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 7	<p>Develop partnerships and begin needs assessment for seismic mitigation of critical infrastructure within JeffCo. The Golden Fault and other seismic sources in the region present the potential for a low probability but potentially high consequence earthquake event. This project would begin with a needs assessment to identify critical facilities likely to incur strong ground shaking that could lead to nonstructural and structural damage. Facilities identified for further review would undergo a FEMA rapid visual assessment (FEMA 154) to identify building hazards and potential mitigation options. Benefits include While the risk of earthquake in the area is low, the potential damage could be catastrophic. Performing seismic mitigation would help ensure uninterrupted governmental service for critical infrastructure. This is the first step in reducing earthquake losses including reduced potential for injuries; reduced potential for facility damage and loss of function.</p>	Earthquake	Goals 2,3; Lifelines COM, ENG, FWS, HAZ, H&M, S&S, TRN	Jefferson County Planning & Zoning; USGS, CGS	\$30-80K depending on scope and number of facilities assessed NEHRP, FEMA, DHSEM	Low	Ongoing	Not Started. Low priority considering risk.
Jefferson County 8	<p>Education and awareness of geologic hazards. Due to relative infrequency of geologic hazards in the planning area, the public is not generally well informed about the risks associated with this type of hazard. Work in conjunction with Jill Carlson at Colorado Geological Survey; create GIS layers available to public that identify hazards such as landslide and debris flow and disseminate information. Benefits include While the risk of earthquake in the area is low, the potential damage could be catastrophic. Raising awareness of hazards will enable the public to understand how to survive an earthquake. Improved mapping of debris</p>	Avalanche, Earthquake, Erosion and Deposition, Expansive Soils, Landslide/ Debris Flow/ Rockfall, Subsidence	Goals 1; Lifelines NA	Jefferson County OEM, Local Government (interested parties)	To be determined Grant funding – state and federal	Medium	Ongoing	In Progress. Preparedness campaign update. Hazard study, mitigation and education on Dinosaur Ridge

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	flow and landslide areas could lead to targeted mitigation projects.							
Jefferson County 9	Flood education and outreach. Increase the flood awareness of residents of Jefferson County to protect people and property. This project would build upon annual floodplain notification efforts associated with the County's CRS program participation. Efforts include distributing the MHFD flood awareness brochure to residents in the floodplain. Benefits include increased awareness of the risk and dangers of flooding can reduce the impact of flooding to the citizens of Jefferson County.	Flood	Goals 1,3; Lifelines NA	Jefferson County Planning and Zoning, OEM, MHFD	TBD	Medium	Ongoing with annual efforts	In Progress. Preparedness campaign update. Continued public outreach
Jefferson County 10	Perform hazard fuel mitigation in areas identified as high hazard in countywide and individual CWPPs. This project will perform hazard fuel mitigation in areas that have been identified as high-hazard in countywide and individual CWPPs. Different methods might include tree thinning, mastication, and controlled burning. The CWPP will be referenced for specific areas and recommended treatments. Benefits include fuel mitigation projects improve public safety, reduce risk to firefighters, reduce potential for structure losses and help forest ecology.	Wildfire	Goals 2; Lifelines COM, ENG, S&S	Jefferson County Sheriff's Office in partnership with Jefferson County fire districts and Jefferson Conservation District	Varies depending on the fuel type and acreage. \$2,000 per acre is a typical estimate Grant funding – state (CSFS) and federal (FEMA PDM or HMGP)	High	Ongoing	In Progress. Utilized seasonal fuels crew when Sheriff's Office still held those positions. Mitigated fuels on 250 acres of JCOS land 2016-2020; Mitigating 1,000 acres by 2025. JCD also completed 1400 acres of fuel reduction treatments from 2016-2020
Jefferson County 11	South Weir Gulch rehabilitation. This project provides for the construction of a combination of channel improvements and drop structures to control severe erosion and safely convey runoff from Union Boulevard east to Pierson Street south of Florida Avenue. Currently this section of the South Wier Gulch drainageway is very steep and is rapidly eroding the existing channel. This has resulted in a portion of the channel with almost vertical walls 15-20 feet deep. This erosion has progressed	Dam Failure	Goals 2; Lifelines FWS, S&S	Jefferson County Transportation and Engineering, Mile High Flood District. (The property is privately owned)	\$200,000 Design; \$2,500,000 Construction Mile High Flood District up to 50% of the cost.	Low	TBD	Not Started. Due to cost and a higher priority of replacing failing culverts this project is no longer a project to be completed on the 5 year plan.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	to the rear yard fences of adjacent residences. Benefits include reduction of erosion, improve long term water quality of the stream. Reduction of property loss in area and it will eliminate a safety hazard in the area.							
Jefferson County 12	National Flood Insurance Program (NFIP) and Community Rating System (CRS) participation. This project provides for the continual participation in both the NFIP and CRS floodplain management programs, which enables properties within the county to get flood insurance at reduced rates. In addition, the floodplain management regulations reduce the flood risks for new and reconstructed buildings within the county. Benefits include reducing flood losses for new construction within the county and allow older properties access to flood insurance to help protect existing buildings.	Flood	Goals 1,2,3; Lifelines COM, ENG, FWS, HAZ, H&M, S&S, TRN	Jefferson County Planning and Zoning	Within current county budget. Programs are funded from the county's general fund.	High	Ongoing	Ongoing. Moved up to a Class 5
Jefferson County 13	Storm Ready program participation. This is a National Weather Service (NWS) Program helps communities to better prepare to save lives from the onslaught of severe weather through advanced planning, education and awareness. This is an accredited program through the National Oceanic & Atmospheric Administration & the National Weather Service. Benefits include Once Application has been submitted to the NWS, the application will be reviewed and the Storm Ready chair will assign a team to visit the applicant and discuss options. The end result being a Certified Storm Ready Office and serving residents and County Offices better. An added benefit to this is, once a Community is certified as Storm Ready the Insurance Services	Extreme Temps, Hailstorm, Lightning, Severe Winter Storms, Tornado, Windstorm	Goals 1,2,3; Lifelines COM, ENG, FWS, HAZ, H&M, S&S, TRN	Jefferson County Office of Emergency Management	None or \$5,000, if it is necessary to upgrade equipment, training, staff hours, OT hours, and/or host trainings. EMPG	Medium	Ongoing	In Progress. Application submitted to NWS, will update based on recommendations.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	Organization can provide Community Rating System points which may be applied to lower National Flood Insurance Program (NFIP) flood insurance rates.							
Jefferson County 14	Bi-lingual publications for Jeffco residents. This program will allow publications such as Colorado Life Trak, Jeffco emergency preparedness campaigns, pamphlets to be translated for our Spanish speaking residents of Jeffco. A language assessment should be completed to see if other translations are needed for our residents. Benefits include Giving the Jefferson county bi-lingual speaking communities a resource to use in preparing their homes/families for potential hazards.	Avalanche; Cyber; Dam Failure; Drought; Earthquake; Erosion/ Deposition; Expansive Soils; Extreme Temps; Flood; Hailstorm; Landslides; Lightning; Pandemic; Winter Storms; Subsidence; Tornado; Wildfire; Windstorm	Goals 1; Lifelines NA	Jefferson County Office of Emergency Management	\$10,000 for the translation \$2,000 for the assessment Possible Grants with 50/50 match	Medium	TBD	Not Started.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 15	Public awareness for those in dam inundation areas. There are 30 High Hazard and 11 Significant Risk dam in Jefferson County. Currently there is no notification system to those living downstream of the dam or information that they live in a potentially hazardous area. Our goal is to create and distribute a pamphlet notifying home and business owners that are in a dam inundation area. It will be similar to the mailer distributed to people that live in flood plains. Part of this project is to create digital map layers of the inundation maps that can be incorporated into the county's GIS database. Benefits include Notification of those living in dam inundation areas will increase their awareness that they are in a higher hazard area. Or hope is that this awareness will improve preparedness for those in the area. This, along with better mapping will improve warning capabilities that will potentially save lives in case of a disaster.	Dam Failure	Goals 1,2; Lifelines NA	Jefferson County Office of Emergency Management; Jefferson County Emergency Communication Authority, Jefferson County GIS, Colorado Dam Safety	45000 Possible CDEM/PDM Grants	Medium	TBD	Not Started.
Jefferson County 16	Geographic Information System layer updates. Much of Jefferson County is considered to be in the Wildland Urban Interface (WUI). With diversity of land ownership in Jeffco it has been a challenge to develop GIS layers for wildfires and completed fire management (fuels reduction) projects. Benefits include Having these layers available will be useful during wildfire events, developing future fuels reduction projects and reevaluating completed projects for maintenance/ reentry.	Wildfire	Goals 2; Lifelines COM, ENG, FWS, HAZ, H&M, S&S, TRN	Jefferson County Office of Emergency Management; Jefferson County GIS	\$35,000	High	Ongoing	In Progress. County IT ESRI story map developed

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 17	Discovery of a community-wide slash collection center. Community wide slash removal opportunities to a larger more inclusive community wide audience. This opportunity currently does not exist and the operational components or costs have not yet been finalized.	Flood; Tornado; Severe Winter Storms; Wildfire; Windstorm;	Goals 1; 2; 3; Lifelines TRN; S&S; FWS	Jefferson County, Parks. Local municipalities and community partners.	\$100,000 - \$1,000,000 Program use fee and local authority.	High	2023	New in 2021.
Jefferson County 18	Forest health. Update the Jefferson County Open Space Forest Health Plan and reduce tree density and fuel sources on 1,000 of our 17,000 acres of forested lands.	Wildfire;	Goals 1; 2; 3; Lifelines S&S; FWS; ENG; TRN; COM	Jefferson County Open Space Colorado Forest Restoration Institute, Forest Stewards Guild	More than \$1,000,000 Department Budget and Grants	High	2026	New in 2021.
Jefferson County 19	Habitat restoration. Stronger ecosystems are more resilient to catastrophic event such as flooding, fire, and erosion, so restoring our land is essential to preserve natural aesthetics, restore wildlife habitat, and improve water quality.	Drought; Erosion and Deposition;	Goals 1; 2; 3; Lifelines FWS	Jefferson County Open Space	Unknown Department Budget and Grants	Medium	2026	New in 2021.
Jefferson County 20	Fuel break thinning in right-of-way along evacuation routes within the Wildfire Urban Interface. This project will identify areas within Jefferson County and State right-of-way along evacuation routes in the Wildfire Urban Interface where forest growth has encroached on public streets and roads. Once identified, fuel breaks and debris removal will be enacted within areas that require mitigation. Benefits include safer ingress and egress for citizens and first responders in the event of an emergency.	Dam Failure; Flood; Landslides; Severe Winter Storms; Wildfire	Goals 1; 2; 3; Lifelines S&S; TRN; H&M;	Jefferson County Colorado State Forest Service, Colorado DOT, Multiple Fire Districts, Jefferson County Sheriff, Coalition for the Upper South Platte	Unknown Grants	High	2022-2026	New in 2021.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 21	Stabilize the landslide near the reinforced soil slope (RSS) at the Rocky Mountain Metropolitan Airport (RMMA). The RSS was constructed as part of the safety area at the RMMA in 2014. Since that time, inclinometers have indicated there has been continued movement along a failure plane. The toe of the slope is near Colorado Highway 128 and failure of the RSS would impact Colorado Highway 128. The preliminary mitigation design includes a series of reinforced concrete piers with a series of tiebacks to stabilize the mass. The benefits include continued operations at the RMMA, public safety and limiting the impact to the state highway system. The RMMA is mainly within Jefferson County, however, the mitigation will occur in an area within the City & County of Broomfield.	Landslides, Debris flows, Rockfalls;	Goals 1,2,3; Lifelines S&S; TRN;	Jefferson County - Rocky Mountain Metropolitan Airport, CDOT, Colorado Geological Survey	More than \$1,000,000 legal settlement, department budget and grants	High	2021-2022	New in 2021.
Jefferson County 22	Defensible space and structure hardening mitigation grant fund. Our current regulations work to create defensible space around new structures. The building code requires fire resistant building materials for new homes and additions. Our regulations do not address creating defensible space around existing structures or requiring upgrades to houses and buildings built years ago. A mitigation grant fund would help finance and incentivize making existing development less susceptible to wildfire risk by helping people afford and incentivizing the installation of defensible space and fire resistant materials. Program would also provide a platform to educate existing mountain area residents about the risks of wildfire and what can be done to mitigate those risks.	Wildfire;	Goals 1; 2; 3; Lifelines S&S; FWS;	Development and Transportation Fire Districts, Emergency Management, Strategy Innovation and Finance, Sheriff, Realtors and Insurance agencies.	\$10,000 - \$100,000 Seek additional grants, work with home owner insurance providers, work with realtors, County general fund	High	Would hope to establish funding that would be distributed on an annual basis.	New in 2021.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 23	County road clear zone fund. The County maintains hundreds of miles of roads serving our mountain communities. These roads provide critical evacuation routes for thousands of county citizens who live, work and/or recreate in the mountains. Most of these roads were built many years ago and have right of ways that barely exceed the width of pavement. This project would help address the concern that roadside trees would fall and block transportation during hazard events such as winter storms, wildfires, floods etc. The project entails establishing a desired clear zone around our roadways. The first phase is determining where the most constrained, important roads are and if they are constrained who owns land on each side of the road. This would require research through property ownership databases. The project would also provide resources to purchase easements/fee simple rights to clear trees and other possible impediments from roadsides. Finally, the grant would help fund the clearance of the roadside clear zone. This project if completed would help to ensure that evacuation routes stand a much higher chance of remaining clear during hazard events.	Avalanche; Dam Failure; Erosion and Deposition; Flood; Landslides; Severe Winter Storms; Wildfire; Windstorm;	Goals 1; 2; 3; Lifelines S&S; H&M; TRN;	Development and Transportation Sheriff, CDOT,	\$100,000 - \$1,000,000 Grants, County Funds,	High	2021-2024 Initial research phase would take 6 months. Remainder of project would be ongoing.	New in 2021.
Jefferson County 24	Modernize existing FEMA Zone A floodplains that are outside the MHFD utilizing Lidar. There are approximately 2000 acres of FEMA Zone A floodplains outside of the MHFD that have limited accuracy. The effective boundaries were based on 10-40 foot contours that have a significant margin of error. Utilizing the available Lidar, the boundaries could be remapped with a higher level of confidence. Accurate maps benefit	Flood;	Goals 1; 2; 3; Lifelines S&S; FWS; H&M; COM; TRN;	Jefferson County P&Z Other Jefferson County divisions/departments, CWCB, FEMA	\$100,000 - \$1,000,000 grants	High	2021-2024	New in 2021.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	property owners, first responders, County staff and FEMA staff.							
Jefferson County 25	Update FEMA Zone AE floodplains that are outside of the MHFD. Update the studies associated with the FEMA Zone AE floodplains that are outside of the MHFD and mainly in the mountain areas of the County. The FEMA Zone AE floodplains include approximately 700 acres. The effective data is based on studies that are generally 30+ years old and have varying degrees of accuracy. The benefits would include accurate mapping in areas that have had increased development in that time period which would benefit the citizen, County staff and FEMA staff.	Flood;	Goals 1; 2; 3; S&S; Lifelines FWS; H&M; ENG; COM; TRN;	Jefferson County P&Z Other Jefferson County departments/divisions, CWCB, FEMA	\$100,000 - \$1,000,000 grants	High	2022-2025	New in 2021.
Jefferson County 26	Update the South Fork of Deer Creek floodplain. The South Fork of Deer Creek is partially within the MHFD and is classified as a flood prone area. Completing a study will better define the floodplain risk associated with this segment.	Flood;	Goals 1; 2; 3; S&S; Lifelines COM;	Jefferson County MHFD, CWCB, FEMA	\$10,000 - \$100,000 grants & MHFD	Medium	2022-2024	New in 2021.
Jefferson County 27	Purchase properties from the SFHA to reduce flood losses. Within the MHFD, utilize the MHFD Property Acquisition Reserve (or similar) to acquire properties within the Floodplain Overlay District. Outside of the MHFD, apply for funding to purchase properties within the SFHA to reduce property damage, injuries and loss of life due to flood risk.	Dam Failure; Flood;	Goals 1; 2; 3; S&S; Lifelines H&M; TRN;	Jefferson County Jefferson County departments/divisions, MHFD, CWCB, FEMA	More than \$1,000,000 grants, MHFD, CIP	High	2021-2026	New in 2021.
Jefferson County 28	Bear Creek bank stabilization. The bank along Bear Creek downstream of the Evergreen Lake dam, requires stabilization to reduce flood risk, sediment transport and deposition. There are outfalls that along this segment that increase sediment loading to Bear Creek. Benefits include reducing the flood risk in	Erosion and Deposition; Flood;	Goals 1; 2; 3; Lifelines FWS, S&S	Jefferson County Jefferson County divisions, CWCB, Bear Creek Watershed	\$100,000 - \$1,000,000 grants	Medium	2022-2026	New in 2021.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	the historic commercial area of Evergreen, improved fisheries and reduction of the sediment load in Bear Creek.			Association & Bear Creek Watershed Foundation				
Jefferson County 29	Development and formalization of a standing Local Hazard Mitigation Committee. Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. Jefferson County will convene and facilitate a hazard mitigation committee for the participating jurisdictions to implement this Plan going forward.	Avalanche; Cyber; Dam Failure; Drought; Earthquake; Erosion/Deposition; Expansive Soils; Extreme Temps; Flood; Hailstorm; Landslides; Lightning; Pandemic; Winter Storms; Subsidence; Tornado; Wildfire; Windstorm	Goals 2; 3; Lifelines COM, ENG, FWS, HAZ, H&M, S&S, TRN	TBD Jefferson County Emergency Management, Jefferson County Planning & Zoning, Jefferson County Open Space, Participating Agencies	Unknown Staff time	High	2021	New in 2021. Was not implemented after last HMP update.
Jefferson County 30	Drainage and Flood Control Improvement for Weaver Creek at Belleview Avenue. Replace three existing corrugated metal culvert crossings of Weaver Creek along Belleview. The existing structures were identified in the 2018 master plan as overtopping during the 10 year flood. New structures will be designed to pass the 1% chance flood. The increased capacity of the three structures will allow for emergency services and residents to use Belleview Avenue during a flood event.	Flood;	Goals 2; Lifelines TRN	Jefferson County Transportation and Engineering Mile High Flood District	More than \$1,000,000 50/50 match of all project costs between Jefferson County and Mile High Flood District	High	2023	New in 2021.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 31	Drainage and Flood Control Improvement for Dutch Creek at Yukon Street. The existing corrugated metal culvert overtops by 2 feet during the 10 year flood and 3 feet during the 100 year event. This amount of overtopping makes the road impassible for emergency vehicles and local traffic during storm events. The new culvert will pass the 100 year flood to allow for vehicle access.	Flood;	Goals 2; Lifelines S&S; TRN	Jefferson County Engineering and Transportation Mile High Flood District	More than \$1,000,000 50/50 split of project cost between Jefferson County and Mile High Flood District	High	2025	New in 2021.
Jefferson County 32	Drainage and Flood Improvements for Leyden Creek at Croke Canal. During the 2013 floods in Colorado Leyden Creek overtopped its banks and excess spill flooded Croke Canal. This additional flow flooded homes and properties downstream of Indiana St. The proposed project would create a low flow channel for Leyden Creek under Indiana St and Croke Canal. A spillway would be installed at Croke Canal to prevent flows from entering the canal.	Flood;	Goals 2; Lifelines FWS; TRN	Jefferson County Engineering and Transportation City of Arvada, Mile High Flood District, CDOT	More than \$1,000,000 Cost share between Jefferson County, City of Arvada, and Mile High Flood District.	Low	2026	New in 2021.
Jefferson County 33	Hazard Education and Outreach. Jeffco Rangers and natural resources staff are tasked with making 350,000 in-person, in-parks educational contacts with park visitors by 2025 through the Conservation Greenprint. Many of these educational contacts include information about natural hazards such as floods, fire, winter storms, rockfall, heat stroke and stress in pets and people; and wildlife safety and awareness.	Extreme Temps; Flood; Landslides; Lightning; Severe Winter Storms; Wildfire;	Goals 1; Lifelines NA	Jeffco Parks, Jeffco Open Space, Jefferson County OEM	this cost is tied to general operations department budget	High	350,000 contacts by 2025	New in 2021. Will integrate with preparedness campaign.
Jefferson County 34	Rockfall Hazard Advisory and Education. Design, fabricate and install bi-lingual pedestrian/hiker/climber-oriented rockfall hazard educational and advisory signs at key park locations such as Dinosaur Ridge, South Table Mountain, North Table Mountain and Clear Creek Canyon. A sign at Dinosaur	Landslides	Goals 1; Lifelines NA	Jeffco Open Space Friends of Dinosaur Ridge	Less than \$10,000 department budget	High	2025	New in 2021.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	Ridge alone will reach over 250,000 people annually.							
Jefferson County 35	Create a county-wide clearinghouse for past, present and future wildfire mitigation efforts. Draw on Geographic Information Systems data or mapping provided by partner agencies to build collective knowledge, prioritize mitigation efforts and enhance collaboration regarding public and private land mitigation efforts. GIS data mapping is now done by Jefferson County Open Space on its land. An inventory of community mitigation efforts across Jefferson County led by different entities such as fire rescue agencies, HOAs, cities, etc. will also help expand activities into additional areas that are not currently served. For example: <ol style="list-style-type: none"> 1. Home assessment programs in process 2. Community Wildfire Protection Plans 3. Community Wildfire Protection Implementation Plans 4. Homeowner cost share, tax benefits and grants available 	Wildfire	Goals 1,2,3; Lifelines FWS, S&S	Jeffco Wildland Risk Reduction Commission	Minimal	Medium	2022	New in 2021. This was a recommendation in the 2020 Jeffco Wildland Risk Reduction Task Force report.
Jefferson County 36	Create, brand, maintain, and promote a one-stop webpage on reducing wildfire risk in Jefferson County. Webpage will focus on wildfire mitigation and emergency preparedness. <ol style="list-style-type: none"> 1. Identify the target audience and core content with the help of the Community Education working group. 2. Gather the best content used by the county, CSU Extension Service, Colorado State Forest Service and other resources to help populate web page. 3. Package content as a user-friendly "toolbox" of mitigation and emergency preparedness information. 	Wildfire	Goals 1,2,3; Lifelines FWS, S&S	Jeffco Wildland Risk Reduction Commission	Minimal	Medium	2023	New in 2021. This was a recommendation in the 2020 Jeffco Wildland Risk Reduction Task Force report.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	<p>4. Link to other websites focused on mitigation, wildfire prevention and emergency preparedness, etc. A number of existing web pages provide helpful models for what Jeffco's one- stop web page could look like such as the highly-touted CAL FIRE or Rotary Wildfire Ready. Jeffco Open Space recently launched TerraSource - a web page that more broadly promotes good land stewardship, including a section on forest health and fire mitigation.</p> <p>5. Determine where this website will be housed (e.g., on www.jeffco.us, TerraSource, free- standing site, etc.).</p> <p>6. Promote web page widely among fire rescue districts, HOAs, Chambers of Commerce, service club, real estate groups and others, and encourage them to share information with their distribution lists. Emphasize the value of consistent information when promoting web page.</p> <p>7. Maintain and update website regularly, tapping task force members and the Task Force Community Education Team as a source and a sounding board for new content.</p>							
Jefferson County 37	<p>Implement residential wildfire mitigation program. Provide funding for fire districts to conduct more home assessments for wildfire mitigation. Implement a defensible space home assessment certification program. Educate HOAs and homeowners. The lead agencies would be broad so I would recommend adding the wildland fire risk reduction commission as the lead, fire districts, HOAs. Funding would be approx. \$500,000. The timeframe would be 2021-2026.</p>	Wildfire	Goals 1,2,3; Lifelines FWS, S&S	Jeffco Wildland Risk Reduction Commission, Fire Districts, HOAs	\$500,000; TBD	Medium	2026	New in 2021.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson County 38	<p>Polly Deane Reservoir Remediation. Polly Deane Reservoir located in Easton Regional Park is owned by Bergen Ditch and Reservoir Company. A man-made lake that was partially expanded in mid-1970's, it is located in an urban area and is normally used for storage of irrigation water used by Foothills Park and Recreation District, a major Bergen shareholder (including shares leased from JeffCo). Due to seepage below the dam discovered in spring of 2019, the Colorado Dam Safety Branch has placed a restriction on storage within the reservoir. Bergen has secured a FEMA grant for analysis and design of remedial work on the dam and that work is currently in process to be completed September 2021. Preliminary conclusion is that the toe drain system for the reservoir needs to be replaced along with a full replacement of the reservoir outlet drain, including increasing drain capacity through the outlet. The potential flood area in the event of dam failure places it in a high hazard category with loss of structures and public improvements, and potential loss of life. These improvements will allow the dam to meet or exceed current standards and for the storage restriction to be removed.</p>	Dam Failure; Flood	Goals 1,2,3; Lifelines FWS, S&S	Bergen Ditch and Reservoir Company; Colorado Dam Safety, Jefferson County, FEMA for analysis and remedial design	\$100,000 - \$1,000,000; Federal, State, Local Grants; CWCB construction LOAN; assessments paid by Bergen shareholders.	High	Remedial design and cost estimate -- September 2021; construction 2022 or 2023	New in 2021.

Table 5-4 summarizes the above actions by hazards addressed to demonstrate that the plan addresses a broad range of identified hazards. See the Annexes for additional details on jurisdictional actions. The numbers correspond to the mitigation action number in the first column of Table 5-3 or the corresponding table in the jurisdiction’s annex.

Table 5-4 Mitigation Actions Summarized by Hazard

Jurisdiction	Avalanche	Cyber	Dam Failure	Drought	Earthquake	Erosion and Deposition	Expansive Soils	Extreme Temps	Flood	Hailstorm	Landslides, etc.	Lightning	Pandemic	Severe Winter Storms	Subsidence	Tornado	Wildfire	Windstorm
Jefferson County	8,14, 23,29	14,29	4,11,14,15,20,23,27,29,38	14,19,29	7,8,14,29	8,14,19,23,28,29	8,14,29	13,14,29,33	1,2,3,4,9,12,14,17,20,23,24,25,26,27,28,29,30,31,32,33,38	13,14,29	8,14,20,21,23,29,33	13,14,29,33,34	14,29	13,14,17,20,23,29,33	8,14,29	13,14,17,29	5,6,10,14,16,17,18,20,22,23,29,33,35,36,37	13,14,17,23,29
City of Arvada		14	8,14	6,7,8,9,10,14,16	14	3,8,14	8,14	6,7,8,9,14	1,2,5,6,7,8,9,11,12,13,14,15	8,9,14	14	14	14	4,6,7,8,9,14	14	14	6,7,8,9,10,14,16	6,7,8,9,10,14,16
City of Edgewater	5	4,5	5	5	5	5	5	5	1,2,3,5	5	5	5	5	5	5	5	5	5
City of Golden		6							1,2,3,4								5	
City of Lakewood		5	1,3,7	6,7,8				5,6,7,8	1,2,3,4,6,7	6,7		7		5,6,7		7		5,6,7
City of Wheat Ridge	7	7	7	7,10	7	7,8	7	6,7,10	1,2,3,4,5,7,9	6,7	7	6,7	7	6,7	7	6,7	7	6,7
Town of Morrison		6,7	8	6,7	3	3	3		1,2,3,4,6,7,8					6,7	3		3	4,5,6,7
Arvada FPD				1,2													1,2	1,2
Elk Creek FPD			1		1				1		1		1			1	1,2	1
Evergreen FPD																	1,2,3,4	
Fairmount FPD		3						4		4		2		2,4		2	1,2	2
Foothills FPD																	1,2	

Jurisdiction	Avalanche	Cyber	Dam Failure	Drought	Earthquake	Erosion and Deposition	Expansive Soils	Extreme Temps	Flood	Hailstorm	Landslides, etc.	Lightning	Pandemic	Severe Winter Storms	Subsidence	Tornado	Wildfire	Windstorm
Genesee FPD																	1	
Golden Gate FPD																	1,2,3	
Indian Hills FPD																	1,2	
Inter-Canyon FPD																	1	
North Fork FPD																	1,2,3	
West Metro FPD																	1,2	
Denver Water			2	2					4								1,3,4	
Lookout Mountain Water District			8	1,2,3,5,6,7,8,9,10,11					2,3								4,6,7,8,9,10,11	
Jefferson Conservation District																	1	

6 Plan Implementation and Maintenance

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

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Phase 4 of FEMA's 4 phase process and Step 10 of the 10-step planning process. This section outlines how this plan will be implemented and updated.

6.1 Implementation

Once adopted, the plan faces the truest test of its worth: implementation. While this plan contains many worthwhile projects, the Hazard Mitigation Planning Committee (HMPC) will need to decide which action(s) to undertake first. Two factors will help with making that decision: 1) the priority assigned the actions in the planning process; and 2) funding availability. Low or no-cost projects most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see Section 5.4 for County actions and the jurisdictional annexes for jurisdiction specific actions) and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits of each project to the Jefferson County community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. The three main components of implementation are:

- **IMPLEMENT** the action plan recommendations of this plan;
- **UTILIZE** existing rules, regulations, policies and procedures already in existence; and
- **COMMUNICATE** the hazard information collected and analyzed through this planning process so that the community better understands what can happen where, and what they can do themselves to be better prepared. Also, publicize the "success stories" that are achieved through the HMPC's ongoing efforts.

Simultaneously to these efforts, the HMPC will constantly monitor funding opportunities that could be leveraged to implement some of the more costly actions. This will include creating and maintaining a bank of ideas on how to meet required local match or participation requirements. When funding does become available, the HMPC will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

6.1.1 Role of the All-Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the Hazard Mitigation Planning Committee (HMPC) will transition into the Jeffco All-Hazard Mitigation Advisory Committee (Jeffco AHMAC) as approved by the Board of County Commissioners (BCC). The AHMAC will act as an advisory body tasked with plan implementation and maintenance. 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. This will allow for a single point of centralization for all federally focused mitigation information, strategies, efforts and project prioritization for the entire county. The group will seat its authority and report to the BCC on the status of plan implementation and mitigation opportunities. Additionally, the Jeffco AHMAC supports the forecasted annual reporting requirements by both DHSEM and FEMA.

The scope of the AHMAC will primarily focus efforts around FEMA mitigation dollars, though other funding opportunities may be monitored, including those that can serve or support multi-objective applications. Membership will include, at minimum, the 21 participating agencies that adopted the plan. In adopting the HMP, participating agencies will be eligible for FEMA mitigation dollars. The Chair of the AHMAC will be a rotating position appointed per the group's bylaws (under development).

The Jeffco AHMAC will:

- Act as the County’s central forum for all-hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of the HMP and AHMAC recommended actions;
- Keep the concepts of mitigation in the forefront of community decision-makers by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan’s recommended actions for which no current funding exists;
- Steward implementation and updates of this plan;
- Report on plan progress and recommended changes to the Jefferson County BCC;
- Inform and solicit input from the public; and
- Assess, prioritize, recommend or deny FEMA mitigation grant applications that are not associated with a participating agency that compliment or conflict with the goals, objectives and pre-identified mitigation projects in the HMP.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website and local newspapers.

By adopting this plan, each participating jurisdiction agrees to engage in the ongoing implementation and maintenance activities described in the plan. Each jurisdiction that also meets State of Colorado and FEMA requirements for mitigation grant programs, will identify one representative for the AHMAC, subject to approval by the Jefferson County Board of County Commissioners.

6.2 Plan Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

6.2.1 Monitoring

In order to track progress and update the mitigation strategies identified in the action plan, the HMPC will revisit this plan annually or after a significant hazard event or disaster declaration. Jefferson OEM is responsible for initiating this review and convening members of the AHMAC on a once yearly basis, or more frequently as needed. The annual review will be held in January of each year, beginning in 2022.

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. With the initial approval of this plan occurring in mid-2021, the plan will need to be updated, re-approved by the Colorado Division of Homeland Security and Emergency Management (DHSEM) and FEMA Region VIII, and re-adopted by all participating jurisdictions no later than June of 2026. The County will monitor planning grant opportunities from DHSEM and FEMA for funds to assist with mitigation projects, as well as with the 5-year update. These grants should be pursued as early as 2024, as some grants have a three-year performance period to expend the funds, plus there is no guarantee that the grant will be awarded when initially submitted. This allows time to resubmit the grant in 2025 if needed.

6.2.2 Evaluation

Updates to this plan will follow the latest FEMA and DHSEM planning guidance. 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).

The AHMAC will use the following process to evaluate progress and any changes in vulnerability as a result of plan implementation.

- A representative from the responsible entity identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the AHMAC on project status and provide input on

whether the project as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.

- If the project does not meet identified objectives, the AHMAC will determine what alternate projects may be implemented
- New projects identified will require an individual assigned to be responsible for defining the project scope, implementing the project, and monitoring success of the project.
- Projects that were not ranked high priority but were identified as potential mitigation strategies will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to the plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

6.2.3 Updates

Updates to this plan will:

- Consider changes in vulnerability due to project implementation;
- Document success stories where mitigation efforts have been completed or proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Document hazard events and impacts that occurred within the five-year period;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate documentation of continued public involvement;
- Incorporate documentation to update the planning process that may include new or additional stakeholder involvement;
- Incorporate growth and development-related changes to building inventories;
- Incorporate new project recommendations or changes in project prioritization;
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to DHSEM/FEMA;
- Align with the latest FEMA and State of Colorado guidance; and
- Include re-adoption by all participating entities following DHSEM/FEMA approval.

6.3 Integration into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is integrating the hazard mitigation plan recommendations and their underlying principles into other existing or new plans and mechanisms. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. The mitigation plan can be considered as the hub of a wheel with spokes radiating out to other related planning mechanisms that will build from the information and recommendations contained herein. Properly implemented, the HMP should serve as one of the foundational documents of the jurisdictions' emergency management programs, since everything emergency management does should relate back in one way or another to the hazards the jurisdiction faces.

As stated in Section 6.1 of this plan, implementation through existing plans and/or programs is recommended, where possible. The County and participating entities already have existing policies and programs to reduce losses to life and property from natural hazards. These are summarized in this plan's capability assessment. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing projects, where possible, through these other program mechanisms. These existing mechanisms include those listed in the Section 2.7 Capability Assessment, as well as those in Section 3.4 of the Planning Process. AHMAC members involved in the updates to these mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, as appropriate.

The following sections provides some guidance on how Jefferson County and participating jurisdictions may use the updated HMP to inform and improve other plans, procedures, and programs. Additional

detail on how the jurisdictions will integrate the HMP into their planning mechanisms can be found in the Annexes.

6.3.1 Comprehensive Plans

Integrating hazard mitigation into the jurisdiction’s comprehensive or general plan is considered a best practice by both FEMA and the American Planning Association. The Jefferson County Comprehensive Plan was last updated in 2017, and included hazards information from the 2016 HMP, which is cited as a supporting document to the Comprehensive Plan. Jefferson County OEM will work with the Planning Department to ensure that hazards data and mitigation goals and objectives inform the next Comprehensive Plan update.

6.3.2 Threat and Hazard Identification and Risk Assessment (THIRA)

Jefferson County has completed a County-level Threat and Hazard Identification and Risk Assessment (THIRA). CPG201 Threat and Hazard Identification and Risk Assessment (THIRA) establishes Step 1 as “Identify the Threats and Hazards of Concern” and lists HIRAs and HMPs as possible sources of threat/hazard information.

The criteria for selecting which Threats/Hazards are “of concern” are defined as:

- Factor #1: Likelihood of a Threat or Hazard Affecting a Community
- Factor #2: The Impacts of a Threat or Hazard

Each natural and human-caused hazard profiled in the HIRA (Section 4) contains a section analyzing the probability of future events, which provides a data-driven answer to Factor #1. Similarly, the vulnerability assessment section of the hazard profiles address what impacts can realistically be expected from both routine and extreme events of each hazard, which specifically addresses Factor #2.

Step 2 of CPG 201 is to “Give the Threats and Hazards Context” by creating a scenario for each hazard of concern, with specifics like time of day, area, and magnitude of the event, which are then used to establish capability targets for each of the 32 core capabilities. All the hazards profiled in the HIRA contain detailed information to ensure the hazard scenarios are plausible. For some hazards, such as flooding, detailed GIS analysis has been done that can easily be incorporated as THIRA scenarios. Other hazards include details on the most extreme historical events on record that can quickly be updated to modern scenarios.

6.3.3 Recovery Plan

The risk and vulnerability data in the HMP should help inform the post-disaster recovery planning process, especially by ensuring that the recovery elements of those plans fully take into account the dangers posed by other hazards, rather than focusing exclusively on the most recent hazard event. The HMP in turn will be revisited during recovery to help identify opportunities to incorporate mitigation in the recovery and rebuilding process, including maximizing FEMA PA and HMGP funding where applicable.

The FEMA publication “Pre-Disaster Recovery Planning Guide for State Governments” notes:

“...much of the research involved in the development of mitigation plans can be used to inform the pre-disaster recovery planning effort.

“The pre-disaster recovery planning process will benefit from and build upon hazard mitigation as:

- The mitigation planning process identifies local hazards, risks, exposures, and vulnerabilities;
- Implementation of mitigation policies and strategies will reduce the likelihood or degree of disaster-related damage, decreasing demand on resources post-disaster;
- The process will identify potential solutions to future anticipated community problems; and
- Mitigation activities will increase public awareness of the need for disaster preparedness.

“Pre-disaster recovery planning efforts also increase resilience by:

- Establishing partnerships, organizational structures, communication resources, and access to resources that promote a more rapid and inclusive recovery process;
- Describing how hazard mitigation will underlie all considerations for reinvestment;
- Laying out a process for implementation of activities that will increase resilience; and
- Increasing awareness of resilience as an important consideration in all community activities.”

6.3.4 Continuity of Operations Plans (COOP)

All departments and agencies of Jefferson County government are required to maintain a Continuity of Operations Plan (COOP) that details that agency’s critical functions and how they will protect those functions in order to continue to provide essential services during a disaster or interruption. By defining and describing the hazards facing the county, including frequency and severity, the HIRA informs agency COOP plans by giving context to what types of disasters or interruptions are most likely to occur. Critical facilities and assets located in hazard areas in Section 4.2 should be prioritized for COOP planning.

6.3.5 Integrated Preparedness Plan (IPP)

Hazard mitigation principles and procedures should be included in Integrated Preparedness Planning Workshops. Any training and exercise needs identified in the Capabilities Assessment (Section 2.7) and Mitigation Strategy (Section 5) should also be included in the jurisdictions’ IPP.

6.3.6 Public Awareness and Education Programs

The County’s ongoing public education and outreach efforts should reflect the hazards and vulnerabilities described in this Plan. In addition to preparing for disasters, public education should include ways in which the public can reduce their vulnerability to natural and human caused hazards. Furthermore, mitigation activities and success stories should be communicated to the public to show the benefits of effective mitigation planning.

6.3.7 Critical Infrastructure Protection Plan

Critical facilities and assets identified in Section 4.2 should be included in Critical Infrastructure Protection Planning (CIPP), with prioritization given to assets located in hazard-prone areas. Hazardous materials facilities in particular should be viewed both as critical assets in need of protection, and as potential hazards in their own right.

6.3.8 Capital Improvements Plan

Many of the mitigation actions listed in the Mitigation Strategy (Section 5) came from the County’s Capital Improvements Plan, and thus have already been identified for funding. Other high-dollar actions listed or identified in the future can also be added to the Capital Improvements Plan to ensure that hazard mitigation projects continue to receive funding. The prioritization of actions listed in Table 5-3, while not binding on capital improvement planning, can be used to inform the prioritization of those actions. Even projects for which the county intends to seek grant funding may also need to be addressed in the Capital Improvements Plan, given that most mitigation grants require significant local matching funds.

6.3.9 Sustainability Plans

Sustainability is a separate area of concern from hazard mitigation, but there are areas where the two fields overlap and influence one another positively or negatively.

Sustainability plans should be reviewed to identify where there may be synergy between sustainability and mitigation/resiliency. For example, sustainability efforts aimed at increasing County’s adaptability to climate change can also make the county more resilient to drought and severe weather. Increasing the percentage of food obtained locally could make the county more resilient to supply-chain interruptions or the impacts of disasters in other states. Adding more trees and grass to urban areas to reduce the heat island effect could help mitigate the impact of extreme weather events, as well as reducing flood risk by increasing the amount of permeable surfaces. This may help raise the priority of some sustainability efforts, as well as suggest complimentary mitigation efforts.

It is equally important to identify areas where sustainability efforts may work to reduce the county’s resilience to hazards. For example, a sustainability goal of promoting use of public transit and reducing private car ownership could potentially make it harder to evacuate the public during a disaster if public

transit is damaged and offline (as was observed during Hurricane Sandy). Similarly, reduced production of solid waste could lead to a reduction in the number of public resources such as dump trucks, which means that in a disaster those resources would not be available for debris removal and similar tasks. The intent of this review is not to say that sustainability goals should not be pursued, but rather to identify areas of concern that should be considered during implementation of these goals. For example, evacuation plans may need to be revised to reflect a larger percentage of families without cars; or contracts may need to be put in place to obtain additional dump trucks in a disaster.

6.4 Continued Public Involvement

Continued public involvement is also imperative to the overall success of the Plan's implementation. This updated HMP will be posted on the county's website for reference and can be used to help inform the county's ongoing public education and outreach program, such as the completion of mitigation actions that reduce the community's vulnerability, can be shared with the public through forums like the Local Emergency Planning Committee (LEPC), public meetings, and through social media. This helps keep the concept of hazard mitigation alive and helps show the public that their government officials are working to keep them safe.

The update process provides an opportunity to publicize success stories from the Plan implementation and seek additional public comment. When the Planning Team reconvenes for the five-year plan update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. The plan maintenance and update process will include continued public and stakeholder involvement and input through participation in designated committee meetings, surveys, web postings, and press releases to local media.

Continued public outreach and education is an aspect of the mitigation strategy Section 5 of this plan. Activities related to public involvement during the 2021 update are documented in Section 3 and Appendix B.



APPENDIX A: PLAN APPROVAL AND ADOPTION

1. FEMA Plan Review Tool
2. FEMA Approval Packet [pending]
3. Adoption Certificates [pending]



Multi-Hazard Mitigation Plan Adoption Sample Resolution

Resolution # _____

**Adopting the Jefferson County, Colorado
Multi-Hazard Mitigation Plan 2021**

Whereas, (name of county or community) recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, (name of county or community) resides within the Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the Colorado Division of Homeland Security and Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Jefferson County Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

Now, therefore, be it resolved, that the (name of board or council), hereby adopts the Jefferson County Multi-Hazard Mitigation Plan, as an official plan; and

Be it further resolved, Jefferson County Emergency Management will submit this Adoption Resolution to the Colorado Division of Homeland Security and Emergency Management and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.

Passed: _____ (date)

Certifying Official



APPENDIX B: HAZARD MITIGATION PLANNING COMMITTEE

As described in Section 3.4, the Hazard Mitigation Planning Committee (HMPC) was comprised of two groups, a Steering Committee that led the planning and decision-making efforts throughout the planning process, and a Working Group comprised of additional local staff that provided information to the Steering Committee. The Steering Committee is the group responsible for the 10-Step CRS planning process outlined in the 2017 CRS Coordinator's Manual. Membership and participation in the Steering Committee is listed below.

C.1 HMPC Steering Committee Membership

Jurisdiction/Agency	Name	Title	Meeting #1	Meeting #2	Meeting #3	Stakeholder
Arvada Fire Protection District	Kirk Lock	Deputy Chief		Y		
Bergen East/West Dams	Colin Insley	Director of Parks			Y	X
Chatfield State Park	Kris Wahlers	Park Manager	Y	Y	Y	X
City of Arvada	Melissa Ryder	Community Resilience Coordinator	Y	Y	Y	
City of Edgewater	Kit Lammers	Community Services Director	Y	Y	Y	
City of Golden	Michael Hendershot	Emergency Manager		Y	Y	
City of Lakewood	Jesse Miller	Emergency Manager	Y	Y	Y	
City of Wheat Ridge	Mark Westberg	Project Supervisor	Y	Y		
Colorado DFPC	Dan Battin	Division Chief	Y			X
Colorado Parks and Wildlife	John Carson	Park Mgr. - Eldorado Canyon	Y	Y		X
Colorado State University	Nathan Beckman	Supervisory Forester - Golden Field Office		Y		X
Colorado WR	Jim Kirch	Dam Safety Engineer	Y		Y	X
Community Member	Leif Carlson	Citizen Appointment	Y			X
Community Member	Nancy Balter	Citizen Appointment	Y	Y	Y	X
Community Member	Michele Robbins	Community Leader Appointment	Y			X
Consolidated Mutual Water Company	Jarod Roberts	Water Resource Administrator	Y			X
CSU Extension	Mari Johnson	Interim Deputy Director/Natural Resources	Y	Y	Y	X
Denver Mountain Parks	Andrew Perri	Program Manager, Forestry & Natural Resources	Y	Y	Y	X
Denver Water	Rebecca Franco	Emergency Manager	Y	Y	Y	



Jurisdiction/Agency	Name	Title	Meeting #1	Meeting #2	Meeting #3	Stakeholder
Elk Creek Fire	Jacob Ware	Chief	Y			
Evergreen Fire Rescue	Paul Amundson	Captain	Y	Y	Y	
Evergreen Metropolitan District	Chris Schauder	New Services & Environmental Manager	Y			X
Fairmount Fire Rescue	Alan Fletcher	Fire Chief	Y	Y	Y	
Foothills Fire Protection District	Alan Anderson	Fire Chief	Y	Y	Y	
Genesee Fire Rescue	Jason Puffett	Fire Chief	Y	Y		
Golden Gate Fire	Damian DiFeo	Chief	Y	Y	Y	
Indian Hills Fire Protection District	Mark Forgy	Fire Chief	Y	Y		
Inter-Canyon Fire	Skip Shirlaw	Chief	Y	Y		
JeffCo LEPC	Tim Gablehouse	Chair	Y			X
JeffCO Open Space	Cory Marusin	Operations Coordinator			Y	X
Jeffco Wildfire Risk Reduction TF	Cynthia Latham	Community Leader Appointment	Y	Y		X
Jefferson Conservation District	Garrett Stephens	Director	Y	Y	Y	
Jefferson County Planning & Zoning	Pat O'Connell	Floodplain Mgr	Y	Y	Y	
Jefferson County Schools	Bill Robbins	Emergency Manager		Y	Y	X
Jefferson County Sheriff's Office	Erika Roberts	Emergency Management Coordinator	Y	Y	Y	
Lookout Mountain Water District	Bob Heine	Vice President		Y	Y	
Mile High Flood District	Kevin Stewart	Flood Warning Program Manager	Y	Y		X
Mountain Area	Jim King	Fire Marshall		Y	Y	X
North Fork Fire District	Curt Rogers	Fire Chief	Y	Y	Y	
RMMA	Chris Nicholas	Airport Operations Manager	Y	Y		X
State Forest Health Advisory Council	Lyle Laverty	Laverty Group		Y		X
Town of Morrison	Shelley Cobau	Consultant		Y	Y	
U.S. Forest Service	Brian Banks	District Ranger	Y		Y	X
Upper Bear Creek	John Putt	CWPIP Leader	Y	Y	Y	X
West Metro Fire Protection District	Clint Fey	Division Chief	Y	Y	Y	



The Working Group supported the overall HMP process by providing information and data to the CRS Steering Committee for consideration and decision-making. Membership and participation in the Working Group is listed below.

C.2 HMPC Working Group Membership

Jurisdiction/Agency	Name	Title	Meeting #1	Meeting #2	Meeting #3	Stakeholder
Adams County	Ron Sigman	Emergency Manager	Y			X
Arvada Fire Protection District	Todd Hyatt	Battalion Chief			Y	
City and County of Broomfield	Brennan Middleton	Water Resources Administrator	Y	Y		X
City of Arvada	Andy Stewart	Senior Utilities Engineer		Y	Y	
City of Arvada	Ben Irwin	Chief Communications Manager	Y	Y		
City of Arvada	Chris Kampmann	Water System Manager	Y	Y		
City of Arvada	Eric Lewin	Water Operations Supervisor	Y			
City of Arvada	Ike Miller	Fleet Manager	Y			
City of Arvada	Izabela Petrykowska	Economic Development		Y		
City of Golden	Alicia Welch	Fire Chief	Y	Y	Y	
City of Golden	Anne Beierle	Public Works Director	Y	Y		
City of Golden	Joe Puhr	Engineer PW, Floodplain	Y	Y	Y	
City of Lakewood	Audrey Prince	Engineering Div.	Y	Y	Y	
City of Lakewood	Caitlin Long	Sustainability Planner	Y	Y	Y	
City of Lakewood	Ken Perry	Commander, Lakewood PD		Y		
City of Lakewood	Kyle Beck	Public Works - Street Maintenance	Y			
City of Lakewood	Vince Casteel	Public Works Engineering	Y	Y	Y	
City of Lakewood	Anne Heine	City Engineer	Y	Y	Y	
City of Lakewood	Jim Haselgren	Parks Manager		Y		
City of Lakewood	Keith Hensel	Engineering	Y	Y	Y	
City of Westminster	Greg Moser	Emergency Manager	Y	Y	Y	X
Clear Creek County	Suzzane Boccia	Emergency Manager	Y			X
Colorado DHSEM - Mitigation	Grey La Certe	Regional Field Manager		Y	Y	X
Colorado DHSEM - Mitigation	Mark Thompson	Mitigation Planning Specialist	Y	Y		X
Colorado DHSEM - Mitigation	Patricia Gavelda	State Hazard Mitigation Officer	Y	Y		X



Jurisdiction/Agency	Name	Title	Meeting #1	Meeting #2	Meeting #3	Stakeholder
Colorado Parks and Wildlife	Todd Farrow	Park Mgr. - Golden Gate	Y			X
Colorado Parks and Wildlife	Zach Taylor	Park Mgr. - Staunton	Y	Y		X
Denver Water	Cynthia Brady	Water Resources Engineer		Y	Y	
Evergreen Fire Rescue	Rachel Rush	Fire Inspector	Y	Y		
Fairmount Fire Rescue	Brycen Hammer	Fire Inspector		Y		
Fairmount Fire Rescue	Joe Snyder	Division Chief	Y	Y	Y	
Fairmount Fire Rescue	Robert Ipatenco	Division Chief		Y		
Genesee Fire Rescue	Dorie Dalton	Firefighter			Y	
Gilpin County	Nathan Whittington	Emergency Manager	Y	Y		X
Jefferson County	Andre Jaen	Building Safety		Y	Y	
Jefferson County	Bailey Becker	Public Affairs		Y		
Jefferson County	Jill Fraser	BIT Chief Info Security Officer	Y	Y	Y	
Jefferson County	Kym Sorrells	County Attorney	Y	Y		
Jefferson County	Lesley Dahlkemper	Commissioner & Task Force Chair	Y	Y		
Jefferson County	Michael Dobbs	Safety & Compliance Director	Y	Y	Y	
Jefferson County	Becky Baker	Building Safety	Y	Y	Y	
Jefferson County	Brian Bishop	Deputy Airport Director - RMMA	Y			
Jefferson County	Chris O'Keefe	Planning & Zoning Director	Y	Y		
Jefferson County	Don Davis	County Manager	Y			
Jefferson County	Dylan Monke	Planning & Zoning Planner	Y	Y		
Jefferson County	Ed Peck	Building Safety	Y	Y		
Jefferson County	Gerald Bader	Open Space Natural Resources	Y	Y	Y	
Jefferson County	Jeanie Rossillon	Road & Bridge	Y			
Jefferson County	Julie Story	Public Affairs	Y			
Jefferson County	Kate Newman	Deputy County Manager	Y			
Jefferson County	Mark Danner	Facilities Management Director			Y	
Jefferson County	Mary Ann Bonnell	Open Space	Y		Y	
Jefferson County	Sage Wall	BIT GIS	Y			



Jurisdiction/Agency	Name	Title	Meeting #1	Meeting #2	Meeting #3	Stakeholder
Jefferson County	Steve Durian	Transportation & Engineering	Y	Y	Y	
Jefferson County	Tom Hoby	Open Space	Y		Y	
Jefferson County	Kurtis Behn	County Attorney			Y	
Jefferson County Public Health	Anjanette Hawkins	EPR Planner			Y	
Jefferson County Public Health	Nathan Rodriguez	EPR Planner			Y	
Jefferson County Road & Bridge	Joe Manchen	Senior Supervisor District 1	Y	Y		
Jefferson County Road & Bridge	Will Truesdale	Construction Manager	Y	Y		
Jefferson County Schools	Madalena DeAndrea	Emergency Planning & Training Specialist		Y	Y	X
Jefferson County Sheriff's Office	Halil Grieb	Emergency Management Director	Y	Y		
Jefferson County Sheriff's Office	J.D. Jepkema	Division Chief	Y			
Jefferson County Sheriff's Office	Jessica Parviar	Grants Specialist	Y			
Jefferson County Sheriff's Office,	Jesse Daniel	Emergency Management			Y	
Lookout Mountain Water District	Sue Ballinger	Office Manager	Y			
Mile High Flood District	Bryan Kohlenberg	Watershed Manager	Y		Y	X
Mile High Flood District	Brooke Seymour	Project Manager for NE JeffCo			Y	X
Mile High Flood District	Jim Watt	Project Manager for the Coal Creek watershed			Y	X
Town of Morrison	Kara Winters	Town Manager	Y			
West Metro Fire Rescue	Steve Aseltine	Division Chief	Y			
West Metro Fire Protection District	Don Lombardi	Fire Chief	Y			
Wood E&IS Consultant Team	Scott Field	Project Manager	Y	Y	Y	
Wood E&IS Consultant Team	Jeff Brislawn	Program Lead	Y	Y		
Wood E&IS Consultant Team	Amy Carr	Planner	Y	Y	Y	
Wood E&IS Consultant Team	Chris Johnson	Planner	Y	Y	Y	
Wood E&IS Consultant Team	Mack Chambers	GIS Specialist	Y	Y		

The makeup of the HMPC was structured to ensure it included expertise with all six mitigation categories as defined by the CRS. The following table indicates the Steering Committee members and areas of mitigation expertise.



C.3 Steering Committee Expertise with Mitigation Categories

Jurisdiction/Agency	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Critical Facilities Protection	Structural Projects
Arvada Fire Protection District	X	X	X	X		
Bergen East/West Dams	X	X	X	X		
Chatfield State Park	X	X	X	X		
City of Arvada	X	X	X	X	X	X
City of Edgewater	X	X	X			X
City of Golden	X	X	X	X	X	X
City of Lakewood	X	X	X	X	X	X
City of Wheat Ridge		X			X	X
Colorado DFPC	X	X	X	X		
Colorado Parks and Wildlife	X	X	X	X		
Colorado State University	X	X	X	X	X	
Colorado WR	X	X	X	X	X	X
Community Member			X			
Consolidated Mutual Water Company	X		X	X		
CSU Extension	X		X	X		
Denver Mountain Parks	X		X	X		
Denver Water	X	X	X	X	X	X
Elk Creek Fire	X	X	X	X		
Evergreen Fire Rescue	X	X	X	X		



Jurisdiction/Agency	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Critical Facilities Protection	Structural Projects
Evergreen Metropolitan District	X	X	X	X	X	X
Fairmount Fire Rescue	X	X	X	X		
Foothills Fire Protection District	X	X	X	X		
Genesee Fire Rescue	X	X	X	X		
Golden Gate Fire	X	X	X	X		
Indian Hills Fire Protection District	X	X	X	X		
Inter-Canyon Fire	X	X	X	X		
Jeffco Wildfire Risk Reduction TF	X			X		
Jefferson Conservation District	X		X	X		
Jefferson County LEPC	X				X	
Jefferson County Open Space	X	X	X	X		
Jefferson County Planning & Zoning	X	X				
Jefferson County Schools	X	X	X	X	X	X
Jefferson County Sheriff's Office		X	X			
Lookout Mountain Water District	X		X	X	X	
Mile High Flood District	X	X	X	X	X	X
Mountain Area	X	X	X	X		
North Fork Fire District	X	X	X	X		
RMMA	X		X		X	
State Forest Health Advisory Council	X		X	X		
Town of Morrison	X		X			
U.S. Forest Service	X		X	X		
Upper Bear Creek	X	X	X	X		
West Metro Fire Protection District	X	X	X	X		



APPENDIX C: PLANNING PROCESS DOCUMENTATION



OFFICE OF THE CITY MANAGER
FACSIMILE: 720-898-7515 ▲ TDD: 720-898-7869
PHONE: 720-898-7500

January 21, 2019

Brian Daley
Jefferson County Emergency Management
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr. Daley:

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the City of Arvada is submitting this letter of intent to confirm that the City of Arvada has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the City of Arvada agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

The City of Arvada understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;

- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Mark Deven, commit the City of Arvada to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 21st day of January, 2019

Sincerely,

A handwritten signature in black ink, appearing to read "Mark Deven", with a horizontal line extending to the right.

Mark G. Deven
City Manager



City of Golden | POLICE DEPARTMENT

911 10TH ST. GOLDEN, CO 80401
DISPATCH: 303-384-8045
DISPATCH FAX: 303-384-8036
ADMIN. FAX: 303-277-8781
WWW.CITYOFGOLDEN.NET

January 30 2020

Erika Roberts
Emergency Management Coordinator
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP) Update

Dear Jefferson County,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the City of Golden is submitting this letter of intent to confirm that City of Golden has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, City of Golden agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

The City of Golden understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, William Kilpatrick, Chief of Police commit to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Sincerely

William Kilpatrick
Chief of Police



Honor ★ Integrity ★ Service

An Internationally Accredited Department





10799 W. Alameda Ave #261205
Lakewood, CO 80226
720-661-1738
www.JeffersonConservationDistrict.org

January 17, 2020

Jefferson County Emergency Management
800 Jefferson County Parkway
Golden, Colorado 80401

Re: "Funding Match Commitment Letter" as a participating jurisdiction in the Jefferson County Multi-jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr. Fleer,

This letter serves as Jefferson Conservation District's (JCD) commitment to meet the matching fund requirements for the Jefferson County Hazard Mitigation Plan (HMP) Update.

If awarded an HMGP Planning Grant, JCD will provide local in-kind services in lieu of cash funds in the amount of at least \$2,000.00 via staff time (labor) to assist in the planning process, compilation of data, and other services related to development of the Jefferson County HMP. Documentation of in-kind costs will be tracked by hourly wages and participation in planning activities via official sign-in sheets, and other data gathering needs as assessed and assigned by the Local Planning Committee (LPC).

Therefore, with a full understanding of the fiscal obligations incurred by this agreement, I, Garrett Stephens, commit JCD match funding to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort, executed this 17th day of January 2020.

Sincerely,

A handwritten signature in black ink, appearing to read 'Garrett Stephens', is written over a light blue horizontal line.

Garrett Stephens
Director
Jefferson Conservation District



1600 W. 12th Ave
Denver, CO 80204
303.628.6000

December 5, 2019

Brian Daley
Director of Emergency Management
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr. Daley,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, Denver Water is submitting this letter of intent to confirm that we have agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Denver Water agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

Denver Water understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Rebecca J. Franco, Manager of Emergency Management, commit Denver Water to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Please let me know if additional information is needed to support this effort.

Sincerely,

A handwritten signature in blue ink that reads 'Rebecca J. Franco'.

Rebecca J. Franco
Manager, Emergency Management



1600 W. 12th Ave
Denver, CO 80204
(303) 628-6000

FUNDING MATCH COMMITMENT LETTER

December 5, 2019

Jefferson County Emergency Management
800 Jefferson County Parkway
Golden, CO 80401

Re: "Funding Match Commitment Letter" as a participating jurisdiction in the Jefferson County Multi-jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr. Daley,

This letter serves as Denver Water's commitment to meet the matching fund requirements for the Jefferson County Hazard Mitigation Plan (HMP) Update.

If awarded an HMGP Planning Grant, Denver Water will provide local in-kind services in lieu of cash funds in the amount of at least \$1,500 via staff time (labor) to assist in the planning process, compilation of data, and other services related to development of the Jefferson County HMP. Documentation of in-kind costs will be tracked by hourly wages and participation in planning activities via official sign-in sheets, and other data gathering needs as assessed and assigned by the Local Planning Committee (LPC).

Therefore, with a full understanding of the fiscal obligations incurred by this agreement, I Rebecca Franco, commit Denver Water match funding to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 5th day of December 2019


Rebecca J. Franco
Manager of Emergency Management



LETTER OF INTENT TO PARTICIPATE

July 7, 2020

Erika Roberts
Emergency Management Coordinator
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP) Update

Dear Jefferson County,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the City of Edgewater is submitting this letter of intent to confirm that City of Edgewater has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Edgewater agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

Edgewater understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Dan Maples (City Manager), commit the City of Edgewater to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.



Dan Maples
City Manager



ELK CREEK FIRE PROTECTION DISTRICT
11993 Blackfoot Road – PO Box 607 – Conifer, Colorado 80433

FUNDING MATCH COMMITMENT LETTER

December 11, 2019

Jefferson County Emergency Management
800 Jefferson County Parkway
Golden, Colorado, 80401

Re: “Funding Match Commitment Letter” as a participating jurisdiction in the Jefferson County Multi-jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr., Daley

This letter serves as Elk Creek Fire Protection District’s commitment to meet the matching fund requirements for the Jefferson County Hazard Mitigation Plan (HMP) Update.

If awarded an HMGP Planning Grant, Elk Creek Fire Protection District will provide local in-kind services in lieu of cash funds in the amount of at least \$1,500 via staff time (labor) to assist in the planning process, compilation of data, and other services related to development of the Jefferson County HMP. Documentation of in-kind costs will be tracked by hourly wages and participation in planning activities via official sign-in sheets, and other data gathering needs as assessed and assigned by the Local Planning Committee (LPC).

Therefore, with a full understanding of the fiscal obligations incurred by this agreement, I Jacob Ware, commit Elk Creek Fire Protection District match funding to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 11th day of December

Jacob N. Ware



Evergreen Fire/Rescue

1802 Bergen Parkway • Evergreen, Colorado 80439
Phone: 303-674-3145 • Fax: 303-674-8701

January 29, 2020

Erika Roberts
Emergency Management
800 Jefferson County Pkwy.
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Erika,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Evergreen Fire Protection District is submitting this letter of intent to confirm that Evergreen Fire Protection District has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Evergreen Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

Evergreen Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, Mike Weege, commit Evergreen Fire Protection District to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 29th day of January, 2020.

Mike Weege, Fire Chief



Evergreen Fire/Rescue

1802 Bergen Parkway • Evergreen, Colorado 80439
Phone: 303-674-3145 • Fax: 303-674-8701

January 29, 2020

Jefferson County Emergency Management
800 Jefferson County Parkway
Golden, Colorado 80401

Re: "Funding Match Commitment Letter" as a participating jurisdiction in the Jefferson County Multi-jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Roberts,

This letter serves as Evergreen Fire Protection District commitment to meet the matching fund requirements for the Jefferson County Hazard Mitigation Plan (HMP) Update.

If awarded an HMGP Planning Grant, Evergreen Fire Protection District will provide local in-kind services in lieu of cash funds in the amount of at least \$1500.00 via staff time (labor) to assist in the planning process, compilation of data, and other services related to development of the Jefferson County HMP. Documentation of in-kind costs will be tracked by hourly wages and participation in planning activities via official sign-in sheets, and other data gathering needs as assessed and assigned by the Local Planning Committee (LPC).

Therefore, with a full understanding of the fiscal obligations incurred by this agreement, I, Mike Weege, commit Evergreen Fire Protection District match funding to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 29th day of January, 2020.

Mike Weege, Fire Chief



Providing the Highest Level of Professional Services

December 4, 2019

Jefferson County Emergency Management
800 Jefferson County Parkway
Golden, Colorado 80401

Re: "Funding Match Commitment Letter" as a participating jurisdiction in the Jefferson County Multi-jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr, Daley

This letter serves as Fairmount Fire Protection District's commitment to meet the matching fund requirements for the Jefferson County Hazard Mitigation Plan (HMP) Update.

If awarded an HMGP Planning Grant, Fairmount Fire Rescue will provide local in-kind services in lieu of cash funds in the amount of at least \$1,500 via staff time (labor) to assist in the planning process, compilation of data, and other services related to development of the Jefferson County HMP. Documentation of in-kind costs will be tracked by hourly wages and participation in planning activities via official sign-in sheets, and other data gathering needs as assessed and assigned by the Local Planning Committee (LPC).

Therefore, with a full understanding of the fiscal obligations incurred by this agreement, I Alan F. Fletcher, commit Fairmount Fire Rescue match funding to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 4th day of December, 2019

A handwritten signature in blue ink, appearing to read "Alan F. Fletcher".

Alan F. Fletcher, Fire Chief





Providing the Highest Level of Professional Services

December 4, 2019

Brian C. Daley
Jefferson County Colorado
800 Jefferson County Pkwy.
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Brian,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Fairmount Fire Protection District is submitting this letter of intent to confirm that Fairmount Fire Rescue has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning Fairmount Fire Rescue agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

Fairmount Fire Rescue understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Alan F. Fletcher, Fire Chief, commit Fairmount Fire Rescue to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 4th day of December, 2019

A blue ink signature of Alan F. Fletcher, Fire Chief.

Alan F. Fletcher, Fire Chief





Foothills Fire Protection District

LETTER OF INTENT TO PARTICIPATE

February 6, 2020

Erika Roberts
Emergency Management Coordinator
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP) Update

Dear Erika Roberts,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, Foothills Fire Protection District is submitting this letter of intent to confirm that Foothills Fire Protection District has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Foothills Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

Foothills Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Alan Anderson, Fire Chief, commit Foothills Fire Protection District to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Alan Anderson – Fire Chief

LETTER OF INTENT TO PARTICIPATE

Jefferson County Emergency Management

January 13, 2019

Brian Daley
Jefferson County Emergency Management
800 Jefferson County Pkwy
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in Jefferson County Emergency Management Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Jefferson County Emergency Management,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Genesee Fire Protection District is submitting this letter of intent to confirm that Genesee Fire Protection District has agreed to participate in the Jefferson County Emergency Management Multi-Jurisdictional Hazard Mitigation Planning effort.

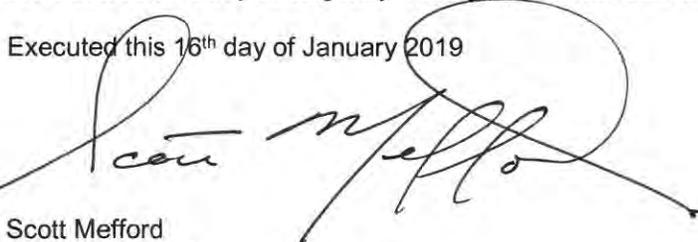
Further, as a condition to participating in the mitigation planning, Genesee Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Jefferson County Emergency Management to complete the plan in conformance with FEMA requirements.

Genesee Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Scott Mefford, commit Genesee Fire Protection District to the Jefferson County Emergency Management Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 16th day of January 2019



Scott Mefford
Board President

FUNDING MATCH COMMITMENT LETTER

Genesee Fire Protection District

January 16, 2019

State Hazard Mitigation Officer (SHMO)
Colorado Division of Homeland Security & Emergency Management (DHSEM)
9195 East Mineral Avenue, Suite 200
Centennial, CO 80112

Re: "Funding Match Commitment Letter" as a participating jurisdiction in Jefferson County Multi-jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr. Board,

This letter serves as Jefferson County's commitment to meet the matching fund requirements for the Jefferson County Hazard Mitigation Plan (HMP) Update.

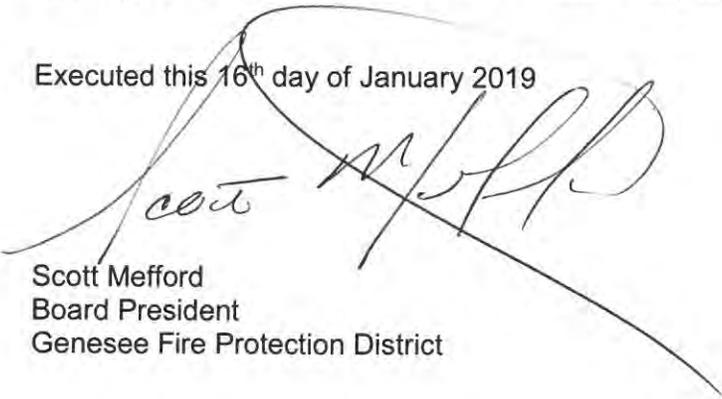
If awarded an HMA Planning Grant, Jefferson County will provide local in-kind services in lieu of cash funds in the amount of at least \$15,425 via staff time (labor) to assist in the planning process, compilation of data, and other services related to development of the Jefferson County HMP. Documentation of in-kind costs will be tracked by hourly wages and participation in planning activities via official sign-in sheets, and other data gathering needs as assessed and assigned by the Local Planning Committee (LPC).

AND

If awarded an HMGP Planning Grant, Jefferson County will provide local cash matching funds in the amount of \$8,000 for development of the Jefferson County HMP. These cash funds will be available as of January 1, 2020

Therefore, with a full understanding of the fiscal obligations incurred by this agreement, I Scott Mefford, Board President of Genesee Fire Protection District, commit Jefferson County match funding to the Jefferson County Multi- Hazard Mitigation Planning effort.

Executed this 16th day of January 2019



Scott Mefford
Board President
Genesee Fire Protection District

FUNDING MATCH COMMITMENT LETTER

Genesee Fire Protection District

January 16, 2019

State Hazard Mitigation Officer (SHMO)
Colorado Division of Homeland Security & Emergency Management (DHSEM)
9195 East Mineral Avenue, Suite 200
Centennial, CO 80112

Re: "Funding Match Commitment Letter" as a participating jurisdiction in Jefferson County Multi-jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr. Board,

This letter serves as Jefferson County's commitment to meet the matching fund requirements for the Jefferson County Hazard Mitigation Plan (HMP) Update.

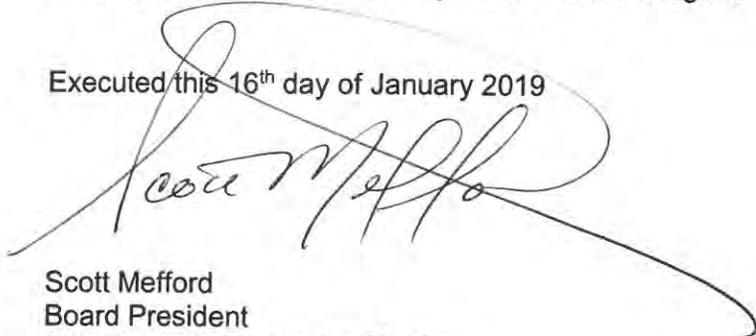
If awarded an HMA Planning Grant, Jefferson County will provide local in-kind services in lieu of cash funds in the amount of at least \$15,425 via staff time (labor) to assist in the planning process, compilation of data, and other services related to development of the Jefferson County HMP. Documentation of in-kind costs will be tracked by hourly wages and participation in planning activities via official sign-in sheets, and other data gathering needs as assessed and assigned by the Local Planning Committee (LPC).

AND

If awarded an HMGP Planning Grant, Jefferson County will provide local cash matching funds in the amount of \$8,000 for development of the Jefferson County HMP. These cash funds will be available as of January 1, 2020

Therefore, with a full understanding of the fiscal obligations incurred by this agreement, I Scott Mefford, Board President of Genesee Fire Protection District, commit Jefferson County match funding to the Jefferson County Multi- Hazard Mitigation Planning effort.

Executed this 16th day of January 2019



Scott Mefford
Board President
Genesee Fire Protection District



INTER-CANYON FIRE PROTECTION DISTRICT

LETTER OF INTENT TO PARTICIPATE

October 2, 2020

Erika Roberts
Emergency Management Coordinator
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP) Update

Dear Mrs. Roberts,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Inter Canyon Fire Protection District is submitting this letter of intent to confirm that Inter Canyon Fire Protection District has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Inter Canyon Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

Inter Canyon Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Skip Shirlaw, commit Inter Canyon Fire Protection District to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Skip Shirlaw
Chief



Lakewood
Police Department

Office of the Chief
Daniel J. McCasky

445 South Allison Parkway
Lakewood, Colorado 80226-3133
www.Lakewood.org
303.987.7100 Voice
303.987.7362 FAX

February 11, 2019

Brian Daley
Emergency Management
800 Jefferson County Pkwy
Golden, CO 80401

Dear Mr. Daley,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Lakewood Police Department is submitting this letter of intent to confirm our participation in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

As a condition to participating in the mitigation planning, we agree to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation, as is necessary, and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

The City of Lakewood understands that it must engage in the following planning process as described, in part, in FEMA's *Local Mitigation Planning Handbook* (March 2013) including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration there has been proactively offered an opportunity for participation in the planning process by all community stakeholders.
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

The Lakewood Police Department fully supports this effort and looks forward to working together with all partner agencies.

Sincerely,

Daniel J. McCasky
Chief of Police





**LETTER OF INTENT TO PARTICIPATE
Lookout Mountain Water District**

1202 Bergen Parkway
Suite 215
Evergreen, CO 80439
303-526-2025

January 14, 2019

Brian C Daley
Jefferson County Emergency Management
800 Jefferson County Parkway
Golden, CO 804012

Re: "Statement of Intent to Participate" as a participating jurisdiction in Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Mr. Daley,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, Lookout Mountain Water District is submitting this letter of intent to confirm that Lookout Mountain Water District has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Lookout Mountain Water District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Jefferson County Emergency Management to complete the plan in conformance with FEMA requirements.

Lookout Mountain Water District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

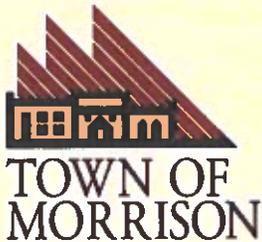
- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Jefferson County Emergency Management and the Lookout Mountain Water District, I Robert M Heine, Board President of Lookout Mountain Water District commit Lookout Mountain Water District to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 14 day of January, 2019:

A handwritten signature in blue ink, appearing to read "Robert M. Heine", is written over a horizontal line.

Robert M. Heine, President
Lookout Mountain Water District



321 Colorado Highway 8
Morrison, Colorado 80465-3001
Phone: 303.697.8749
Fax: 303.697.8752

LETTER OF INTENT TO PARTICIPATE

January 29, 2020

Erika Roberts
Emergency Management Coordinator
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP) Update

Dear Erika Roberts,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Town of Morrison is submitting this letter of intent to confirm that the Town of Morrison has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the Town of Morrison agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

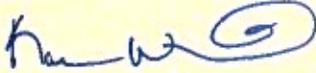
The Town of Morrison understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant

involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);

- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Kara Winters, Town Manager, commit the Town of Morrison to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.



Kara Winters
Town Manager



West Metro Fire Protection District

433 S. Allison Parkway
Lakewood, CO 80226

Bus: (303) 989-4307
Fax: (303) 989-6725
www.westmetrofire.org

LETTER OF INTENT TO PARTICIPATE

February 3, 2020

Erika Roberts
Emergency Management Coordinator
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP) Update

Dear Ms. Roberts,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the West Metro Fire Protection District (District) is submitting this letter of intent to confirm that the District has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

The District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

"Whatever It Takes" ... To Serve

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Fire Chief Don Lombardi, commit the West Metro Fire Protection District to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Sincerely,

A handwritten signature in black ink, appearing to read 'Don Lombardi', written over a circular stamp or seal.

Don Lombardi
Fire Chief



City of Wheat Ridge Municipal Building 7500 W. 29th Ave. Wheat Ridge, CO 80033-8001 Non-emergency: 303.237.2220 Direct: 303.235.2913

Dave Pickett
Interim Chief of Police

January 29, 2020

Erika Roberts
Emergency Management Coordinator
Jefferson County Emergency Management Office
800 Jefferson County Parkway
Golden, CO 80401

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Jefferson County Multi-Jurisdictional Hazard Mitigation Plan (HMP) Update

Dear Ms. Roberts,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the City of Wheat Ridge is submitting this letter of intent to confirm that the City of Wheat Ridge has agreed to participate in the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the City of Wheat Ridge agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Jefferson County to complete the plan in conformance with FEMA requirements.

The City of Wheat Ridge understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, Shellie Salser, Emergency Manager for the City of Wheat Ridge, commit the City of Wheat Ridge to the Jefferson County Multi-Jurisdictional Hazard Mitigation Planning effort.


Shellie Salser, Commander / Emergency Manager


Dave Pickett, Interim Chief of Police

Jefferson County Multi-Jurisdictional Hazard Mitigation Plan 2021 Update

Kickoff Webinar Summary 9:30 AM – 12:00 PM

Introductions and Opening Remarks

This document summarizes the kickoff webinar for the Jefferson County Hazard Mitigation Plan (HMP) update for 2021. The webinar was facilitated by Wood Environment & Infrastructure Solutions, Inc. (Wood), the consulting firm hired to facilitate the planning process and develop the updated multi-jurisdictional plan. This type of meeting is ideally conducted in-person, however in this instance the meeting was done in a webinar format in order to comply with social distancing requirements as a result of the COVID-19 pandemic. Scott Field, Project Manager at Wood, began the meeting with introductions. Eighty-two persons attended the webinar representing a mix of County departments, participating jurisdictions, and stakeholders.

The key discussion is summarized below, and the webinar chat log is attached at the end. Additional details can be found in the meeting PowerPoint presentation and webinar recording.

Hazard Mitigation Overview

Mark Thompson (Colorado Division of Homeland Security and Emergency Management) outlined what hazard mitigation is and why it is important. Hazard mitigation should be an ongoing effort integrated into both day-to-day operations and long-term planning. The overall purpose of a local hazard mitigation plan is to prevent knowable hazards from having an impact on the community.

There are two additional benefits a community gains from having a FEMA approved hazard mitigation plan; (1) bringing people together in the community; (2) eligibility for FEMA mitigation grants. Any requests for FEMA mitigation funding need to be based on the hazards and mitigation strategy in the HMP. The information from the hazard mitigation plan, specifically the vulnerability assessment and mitigation strategy, can be used in other hazard related plans such as community wildfire protection plans.

FEMA will only fund mitigation projects that will reduce future demand for and the costs of disaster response and recovery, such as retrofitting a critical facility, enforcing building codes, land use planning, or removing a structure from a hazard area. Mitigation funding cannot be used for response actions such as purchasing vehicles for fire or police departments. The 2019 National Institute of Building Science Report which showed that mitigation grants funded through select federal government agencies, on average, save the nation \$6 in future disaster costs for every \$1 spent on hazard mitigation.

A Hazard Mitigation Plan is not a regulatory document, nor does it create new regulations. It is not a firm commitment of resources. FEMA and the State encourage communities to be both ambitious and practical when developing mitigation actions. There is a mutual understanding that actions are dependent on the

availability of resources. Communities will not be punished if any of the action included in the plan are not completed.

Hazard Mitigation Planning Process and Requirements

The Disaster Mitigation Act (DMA) of 2000 lays out the specific planning requirements the County will have to meet in order to have a FEMA approved plan; the Jefferson County HMP will be updated in accordance with these requirements.

The first step in getting organized is to obtain community commitment to mitigation, determine and assign staff, establish the hazard mitigation planning team, which has already started with those in attendance at the kickoff webinar, and to determine the planning area. Committee members will include those on the committee for the 2015 planning process. Additional recommendations of who could also be invited to be on the committee include, neighboring jurisdictions, local businesses, nonprofits, school districts, watershed coalitions. Special districts can also be considered jurisdictions and be eligible for FEMA funding on their own, or they have the option to participate as stakeholders.

The following jurisdictions and special districts have committed to participating in the 2021 plan update:

- Jefferson County
- City of Arvada
- City of Edgewater
- City of Golden
- City of Lakewood
- Town of Morrison
- City of Wheat Ridge
- Elk Creek Fire Protection District
- Evergreen Fire Rescue
- Fairmount Fire Rescue
- Foothills Fire Protection District
- Genesee Fire Protection District
- Golden Gate Fire
- Inter-Canyon Fire Protection District
- Jefferson Conservation District
- Lookout Mountain Water District
- West Metro Fire Protection District
- Denver Water

Local input, and participation from the county, municipalities, and special districts is required for full approval from FEMA. Participation includes the following:

- Attend meetings and participate in the planning process
- Provide requested information to update or develop jurisdictional information
- Review drafts and provide comments
- Identify mitigation projects specific to jurisdiction, provide status
- Assist with and participate in the public input process
- Coordinate formal adoption

Stakeholders include other local, state and federal agencies with a stake in hazard mitigation in the County or may include academic institutions and local business and industry. Stakeholders may include the Colorado Department of Homeland Security (DHSEM), Colorado Division of Water Resources, Colorado State Forest Service, CDOT, Colorado State Patrol, Colorado Parks and Wildlife, Colorado Water Conservation Board, USGS, U.S. Forest Service, EPA, FEMA Region VIII, the National Weather Service, and the Mile High Flood District. The HMPC noted that risk management should also be included as a stakeholder. Neighboring counties will also be notified about the update and given an opportunity to provide input into the process.

Stakeholders do not need to adopt the plan, and will not be eligible to apply directly to FEMA for grant funding. Stakeholders have various options and levels of participation including:

- Attend HMPC meetings or stay in loop via email list
- Provide data/information
- Partner on mitigation efforts
- Review draft plan

Another requirement of the plan update process is performing a community capability assessment. This is an assessment of the communities existing plans, regulations, fiscal abilities, administrative and technical abilities. Identifying fiscal abilities early on is important because FEMA grants generally require a 25% match of local funds. Early identification will help to understand potential funding sources now that could be used to possibly match the federal funds. Additionally, it is important that participating jurisdictions track any time in which they are engaged in the Hazard Mitigation Process and provide this information to the Project Lead as this time can be used to meet this match requirement.

Conducting a risk assessment is a key aspect of a hazard mitigation plan and involves two components: hazard identification (what can happen here) and the vulnerability assessment (what will be affected). The HMP update will be based on existing documents and studies, with the Jefferson County Hazard Mitigation Plan (2016) providing the baseline for identified hazards and the groundwork for goals, policies and actions for hazard mitigation.

The HMP will be updated over the next six months, with at least two more meetings with the Hazard Mitigation Planning Committee. Wood will be updating the Hazard Identification and Risk Assessment (HIRA) in the next couple of months, with input from the HMPC. Three drafts of the HMP will be created: the first for review by HMPC members, a second for public review, and a third for state and FEMA review. The tentative project schedule is shown below, although these dates may need to be adjusted based on the ongoing pandemic situation.

Planning For Public Involvement

An important requirement of the hazard mitigation planning process is to involve the public in the process. FEMA requires two opportunities for public involvement: once during the drafting stage and once more prior to plan approval. FEMA does not prescribe how to involve the public at either of these steps. There are several advantages to involving the public including developing solutions that fit local needs better, strengthening local support for the plan and ensuring a fair process in the development of the plan. Wood will be creating an online public survey for the County and jurisdictions to advertise via their media and social media accounts. Two public meetings will also be held, one at the beginning of the process and one during the public review draft comment period.

Overview of 2016 Hazard Mitigation Plan

The list of hazards included in the 2016 plan was reviewed for inclusion in the 2021 plan update.

- | | | |
|--------------------------|------------------------|-----------------------------|
| • Avalanche | • Expansive Soils | • Landslides, Debris flows, |
| • Dam Failure | • Extreme Temperatures | Rockfalls |
| • Drought | • Flood | • Severe Winter Storms |
| • Earthquake | • Hailstorm | • Subsidence |
| • Erosion and Deposition | | • Tornado |

- Wildfire
- Windstorm

The following human-caused hazards may also be considered to add to the 2020 Plan Update

- Pandemic
- Hazardous Materials Incidents
- Active Threat
- Cyber Threat
- Utility Disruption
- Civil Disturbance
- Aircraft Incident
- Transportation Accident

The Planning Committee is asked to review the list of hazards and comment on how they could be enhanced or updated with:

- Historic incidents
- Incident logs
- Public perception
- Scientific studies
- Other plans and reports (e.g., flood and drainage studies, CWPPs, Internet databases)
- Recent disasters

Coordinating with Other Agencies, Related Planning Efforts, and Recent Studies

A discussion on recent studies of hazards in other documents and reports followed the identified hazards discussion. Opportunities for coordinating and cross-referencing the HMP were discussed. Discussions on the benefits of the Community Rating System (CRS) were also had.

Initial Information Needs and Next steps

The project schedule was reviewed:

<u>Project Milestone</u>	<u>Anticipated Timeline</u>
• HMPC Meeting #2 – HIRA Review	January 2021
• HMPC Meeting #3 – Mitigation Goals	February 2021
• 2 Public Workshops	Jan/Feb & April 2021
• Updated HIRA	February 2021
• HMPC Review Draft	Mid-March 2021
• Public Review Draft	Early April 2021
• CO DHSEM Review	April 2021
• Final Plan for FEMA Review (estimated)	May 2021
• FEMA Review (estimated)	May-June 2021
• Final Approved HMP for local adoption	July 2021

Initial information needs and next steps were discussed. Wood will be sending a Data Collection Guide requesting input on:

- Recent hazard events (since 2016)
- Growth and development trends
- Recent updated plans and policies

Where available online, Wood will try to obtain the updated plans previously noted. The HMPC is encouraged to send other information that might not be readily accessible online.

Wood will begin work in the Hazard Identification and Risk Assessment update and develop a public survey that can be used online, with a hardcopy version for dissemination at local events.

The next HMPC webinar is tentatively planned for January following the update of the Hazard Identification and Risk Assessment section of the plan. Meeting dates and other deadlines will be shared when available.

Adjourn

The meeting adjourned at 12:00 pm

Jefferson County Hazard Mitigation Plan 2021 Update

Kickoff Meeting Chat Log

Meeting started 12/7/20 8:55 AM

[12/7/20 9:22 AM] Unknown User Guest joined the meeting.

[12/7/20 9:22 AM] Unknown User Chris Kampmann; Arvada joined the meeting.

[12/7/20 9:22 AM] Unknown User Guest joined the meeting.

[12/7/20 9:22 AM] Unknown User Mark Westberg joined the meeting.

[12/7/20 9:22 AM] Unknown User Erika Roberts (Guest) joined the meeting.

[12/7/20 9:22 AM] Unknown User Chris Schauder joined the meeting.

[12/7/20 9:22 AM] Unknown User Guest left the conversation.

[12/7/20 9:22 AM] Unknown User Kris Wahlers (Guest) joined the meeting.

[12/7/20 9:23 AM] Unknown User Pat OConnell joined the meeting.

[12/7/20 9:24 AM] Unknown User Skip Shirlaw (Guest) joined the meeting.

[12/7/20 9:25 AM] Unknown User Curt Rogers joined the meeting.

[12/7/20 9:25 AM] Unknown User J Puhr Golden, CO (Guest) joined the meeting.

[12/7/20 9:25 AM] Unknown User Todd Farrow - CPW (Guest) joined the meeting.

[12/7/20 9:25 AM] Unknown User Alan Anderson Foothills Fire (Guest) joined the meeting.

[12/7/20 9:26 AM] Unknown User Kris Wahlers (Guest) left the conversation.

[12/7/20 9:26 AM] Unknown User Mari Johnson joined the meeting.

[12/7/20 9:26 AM] Unknown User Kris Wahlers (Guest) joined the meeting.

[12/7/20 9:26 AM] Unknown User Kris Wahlers (Guest) left the conversation.

[12/7/20 9:26 AM] Unknown User Cindy Latham (Guest) joined the meeting.

[12/7/20 9:26 AM] Unknown User Will Truesdale joined the meeting.

[12/7/20 9:26 AM] Unknown User Eric Lewin (Guest) joined the meeting.

[12/7/20 9:26 AM] Unknown User Timothy Gablehouse joined the meeting.

[12/7/20 9:27 AM] Unknown User Jill Fraser joined the meeting.

[12/7/20 9:27 AM] Unknown User Kris Wahlers - Chatfield SP (Guest) joined the meeting.

[12/7/20 9:27 AM] Unknown User Daniel Battin (Guest) joined the meeting.

[12/7/20 9:27 AM] Unknown User Grey La Certe joined the meeting.

[12/7/20 9:27 AM] Unknown User Kyle Beck joined the meeting.

[12/7/20 9:27 AM] Unknown User Suzanne Boccia (Guest) joined the meeting.

[12/7/20 9:27 AM] Unknown User Gerald Bader joined the meeting.

[12/7/20 9:27 AM] Unknown User Fey, Clint joined the meeting.

[12/7/20 9:27 AM] Unknown User Kara (Guest) joined the meeting.

[12/7/20 9:27 AM] Unknown User Rachel Rush-Evergreen Fire Rescue (Guest) joined the meeting.

[12/7/20 9:27 AM] Unknown User Ed Peck joined the meeting.

[12/7/20 9:27 AM] Unknown User Brian Bishop (Guest) joined the meeting.

[12/7/20 9:27 AM] Unknown User Keith Hensel joined the meeting.

[12/7/20 9:27 AM] Unknown User Chris Nicholas (Guest) joined the meeting.

[12/7/20 9:28 AM] Unknown User Jesse Miller joined the meeting.

[12/7/20 9:28 AM] Unknown User Becky Baker (Guest) joined the meeting.

[12/7/20 9:28 AM] Unknown User Franco, Rebecca J. joined the meeting.

[12/7/20 9:28 AM] Unknown User Kit Lammers joined the meeting.

[12/7/20 9:28 AM] Unknown User Alan Fletcher joined the meeting.

[12/7/20 9:28 AM] Field, Scott

Welcome everyone. We'll be getting started in just a few minutes.

[12/7/20 9:29 AM] Unknown User Jessica Parivar (Guest) joined the meeting.

[12/7/20 9:29 AM] Unknown User Damian DiFeo (Guest) joined the meeting.

[12/7/20 9:29 AM] Unknown User Anne Heine joined the meeting.

[12/7/20 9:29 AM] Unknown User Michael Dobbs joined the meeting.
 [12/7/20 9:29 AM] Unknown User Bryan Kohlenberg joined the meeting.
 [12/7/20 9:29 AM] Unknown User Mary Ann Bonnell joined the meeting.
 [12/7/20 9:29 AM] Unknown User Perri, Andrew D. - DPR CA1714 Program Manager joined the meeting.
 [12/7/20 9:30 AM] Unknown User Lombardi, Don joined the meeting.
 [12/7/20 9:30 AM] Unknown User Brennan Middleton (Guest) joined the meeting.
 [12/7/20 9:30 AM] Unknown User Kevin Stewart joined the meeting.
 [12/7/20 9:30 AM] Unknown User Vince Casteel joined the meeting.
 [12/7/20 9:30 AM] Unknown User Dylan Monke joined the meeting.
 [12/7/20 9:30 AM] Unknown User Lesley Dahlkemper joined the meeting.
 [12/7/20 9:30 AM] Unknown User Ike Miller (Guest) joined the meeting.
 [12/7/20 9:30 AM] Unknown User Paul Amundson joined the meeting.
 [12/7/20 9:30 AM] Unknown User Nancy Balter (Guest) joined the meeting.
 [12/7/20 9:30 AM] Unknown User Anne Beierle joined the meeting.
 [12/7/20 9:30 AM] Unknown User Caitlin Hasenbalg Long joined the meeting.
 [12/7/20 9:30 AM] Unknown User garrett stephens (Guest) joined the meeting.
 [12/7/20 9:30 AM] Unknown User Zach Taylor CPW (Guest) joined the meeting.
 [12/7/20 9:31 AM] Unknown User Jim Kirch - CO Dam Safety (Guest) joined the meeting.
 [12/7/20 9:31 AM] Unknown User Jason Puffett joined the meeting.
 [12/7/20 9:31 AM] Unknown User Steve Durian joined the meeting.
 [12/7/20 9:31 AM] Unknown User Gilpin OEM joined the meeting.
 [12/7/20 9:31 AM] Unknown User Leif Carlson joined the meeting.
 [12/7 9:31 AM] Johnson, Christopher A joined the meeting.
 [12/7 9:31 AM] Unknown User Michele Robbins joined the meeting.
 [12/7 9:31 AM] Unknown User Melissa Ryder (Arvada) (Guest) joined the meeting.
 [12/7 9:31 AM] Unknown User John Putt joined the meeting.
 [12/7 9:31 AM] Unknown User Moser, Greg joined the meeting.
 [12/7 9:31 AM] Unknown User Mark Forgy - IHFR (Guest) joined the meeting.
 [12/7 9:31 AM] Unknown User Julie Story joined the meeting.
 [12/7 9:32 AM] Unknown User Ben Irwin, City of Arvada (Guest) joined the meeting.
 [12/7 9:32 AM] Unknown User Sage Wall joined the meeting.
 [12/7 9:33 AM] Unknown User Mark Thompson (Guest) joined the meeting.
 [12/7 9:33 AM] Unknown User Chris Kampmann; Arvada joined the meeting.
 [12/7 9:33 AM] Unknown User Chris Kampmann; Arvada left the conversation.
 [12/7 9:33 AM] Unknown User Audrey Prince joined the meeting.
 [12/7 9:33 AM] Unknown User Tom Hoby joined the meeting.
 [12/7 9:33 AM] Unknown User Chris OKeefe joined the meeting.

[12/7 9:34 AM] Field, Scott

Everyone please mute your mics when not talking, we're getting some background noise. Thank you.

[12/7 9:34 AM] Unknown User John Putt left the conversation.
 [12/7 9:34 AM] Unknown User Kym Sorrells joined the meeting.
 [12/7 9:34 AM] Unknown User Ben Irwin, City of Arvada (Guest) left the conversation.
 [12/7 9:34 AM] Unknown User John Putt joined the meeting.
 [12/7 9:34 AM] Unknown User Ben Irwin, City of Arvada (Guest) joined the meeting.
 [12/7 9:34 AM] Unknown User Jarod Roberts (Guest) joined the meeting.
 [12/7 9:34 AM] Unknown User Aseltine, Steve joined the meeting.
 [12/7 9:35 AM] Unknown User Ronald Sigman joined the meeting.

[12/7 9:35 AM] Erika Roberts (Guest)

Erika Roberts, Jefferson County Sheriff's Office - Emergency Management

[12/7 9:36 AM] Unknown User Alicia Welch joined the meeting.

[12/7 9:36 AM] Unknown User Robbins Bill joined the meeting.

[12/7 9:36 AM] Unknown User Ben Irwin joined the meeting.

[12/7 9:36 AM] Unknown User Ben Irwin, City of Arvada (Guest) left the conversation.

[12/7 9:36 AM] Unknown User Suzanne Boccia (Guest) left the conversation.

[12/7 9:37 AM] Unknown User John Putt joined the meeting.

[12/7 9:37 AM] Unknown User John Carson (Guest) joined the meeting.

[12/7 9:38 AM] Franco, Rebecca J. (Guest)

what's the code?

[12/7 9:38 AM] Carr, Amy

#47527

[12/7 9:38 AM] Unknown User Suzanne Boccia (Guest) joined the meeting.

[12/7 9:41 AM] Unknown User Jacob Ware joined the meeting.

[12/7 9:42 AM] Steve Durian (Guest)

Steve Durian, Jeffco Transportation & Engineering Director

[12/7 9:42 AM] Mary Ann Bonnell (Guest)

Mary Ann Bonnell, Jeffco Open Space, Visitor Services Manager

[12/7 9:42 AM] Julie Story (Guest)

Julie Story - Jefferson County Public Affairs Director

[12/7 9:42 AM] Will Truesdale (Guest)

Will Truesdale, Road and Bridge, Construction Project Manager

[12/7 9:42 AM] Damian DiFeo (Guest)

Damian DiFeo

[12/7 9:42 AM] Mari Johnson (Guest)

Mari Johnson, Natural Resource Agent/Interim Assistant Director, Colorado State University Extension

[12/7 9:42 AM] Todd Farrow - CPW (Guest)

Todd Farrow - Park Manager - Golden Gate Canyon State Park

[12/7 9:42 AM] Jason Puffett (Guest)

Jason Puffett Fire Chief Genesee Fire Rescue

[12/7 9:42 AM] Alan Fletcher (Guest)

Alan Fletcher, Fairmount Fire Rescue, Fire Chief

[12/7 9:42 AM] Sage Wall (Guest)

Sage Wall - Jeffco BIT Senior GIS Analyst

[12/7 9:42 AM] Jessica Parivar (Guest)

Jessica Parivar, JCSO Grants Specialist

[12/7 9:42 AM] Zach Taylor CPW (Guest)

Zach Taylor Park Manager Staunton State Park CPW

[12/7 9:42 AM] Cindy Latham (Guest)
Cindy Latham -- business leader member of Jefferson County Wildfire Risk Reduction Task force.

[12/7 9:42 AM] Ben Irwin (Guest)
Ben Irwin, City of Arvada, Chief Communications Manager

[12/7 9:42 AM] Ike Miller (Guest)
Ike Miller, Fleet Manager for the City of Arvada

[12/7 9:42 AM] Brian Bishop (Guest)
Brian Bishop Deputy Airport Director- RMMA - JeffCo

[12/7 9:42 AM] Gerald Bader (Guest)
Jerry Bader Jefferson County Open Space, Natural Resource Lead

[12/7 9:42 AM] Vince Casteel (Guest)
Vince Casteel City of Lakewood Public Works Engineering

[12/7 9:42 AM] Kevin Stewart (Guest)
Kevin Stewart, Flood Warning & Information Services Manager, Mile High Flood District

[12/7 9:42 AM] Skip Shirlaw (Guest)
Skip Shirlaw

[12/7 9:42 AM] Lesley Dahlkemper (Guest)
Lesley Dahlkemper - Jeffco Commissioner [Link to Wildfire task Force report: <https://www.jeffco.us/3910/Wildfire-Risk-Reduction-Task-Force>]

[12/7 9:42 AM] Aseltine, Steve
Steve Aseltine - West Metro Fire Rescue

[12/7 9:42 AM] Leif Carlson (Guest)
Leif Carlson - Jefferson County Wildfire Risk Reduction Taskforce (Citizen/Business Appointment)

[12/7 9:42 AM] Daniel Battin (Guest)
Daniel Battin, Colorado Division of Fire Prevention & Control, Region 13 Battalion Chief

[12/7 9:42 AM] Perri, Andrew D. - DPR CA1714 Program Manager (Guest)
Andy Perri - Denver Mtn Parks - Program Manager : Forestry and Natural Resources

[12/7 9:43 AM] Michele Robbins (Guest)
Michele Robbins RPM Ins Agency Member of the 2020 Wildfire Taskforce

[12/7 9:43 AM] Ronald Sigman (Guest)
Ron Sigman - Emergency Manager with Adams County; just completed this process with Wood.

[12/7 9:43 AM] Jim Kirch - CO Dam Safety (Guest)
Jim Kirch - CO DWR Dam Safety Engineer

[12/7 9:43 AM] Eric Lewin (Guest)
Eric Lewin City of Arvada, Water Operations Supervisor

[12/7 9:43 AM] Curt Rogers (Guest)
Curt Rogers Chief North Fork FPD

[12/7 9:43 AM] Jacob Ware (Guest)
Jacob Ware Fire Chief Elk Creek Fire Protection District

[12/7 9:43 AM] Fey, Clint (Guest)
Clint Fey - West Metro Fire Rescue

[12/7 9:43 AM] Skip Shirlaw (Guest)
Skip Shirlaw Inter Canyon Fire

[12/7 9:43 AM] Brennan Middleton (Guest)
Brennan Middleton - Broomfield - Water Resources Administrator

[12/7 9:43 AM] Pat OConnell (Guest)
Patrick O'Connell, Jefferson County Planning & Zoning, Engineering Geologist

[12/7 9:43 AM] Unknown User Suzanne Boccia (Guest) left the conversation.

[12/7 9:43 AM] Damian DiFeo (Guest)
Damian DiFeo Golden Gate Fire, Fire Chief

[12/7 9:43 AM] Anne Heine (Guest)
Anne Heine

[12/7 9:43 AM] Timothy Gablehouse (Guest)
Tim Gablehouse, Chair - Jeffco LEPC and member Colorado SERC

[12/7 9:43 AM] Chris Schauder (Guest)
Chris Schauder, Evergreen Metropolitan District, New Services & Environmental Mgr.

[12/7 9:43 AM] Unknown User Chris Kampmann; Arvada left the conversation.

[12/7 9:43 AM] Paul Amundson (Guest)
Paul Amundson Evergreen Fire Rescue

[12/7 9:43 AM] Jarod Roberts (Guest)
Jarod Roberts - The Consolidated Mutual Water Company

[12/7 9:43 AM] Lombardi, Don (Guest)
Don Lombardi - Fire Chief WMFR

[12/7 9:43 AM] Chris Nicholas (Guest)
Chris Nicholas RMMA Airport Operations Manager

[12/7 9:44 AM] John Carson (Guest)
John Carson Eldorado Canyon State Park

[12/7 9:44 AM] Unknown User Jason Slowinski joined the meeting.

[12/7 9:44 AM] Unknown User Chris Kampmann; City Of Arvada joined the meeting.

[12/7 9:44 AM] Bryan Kohlenberg (Guest)
Bryan Kohlenberg, Mile High Flood District, Watershed Manager

[12/7 9:44 AM] Unknown User Moline, Ben joined the meeting.

[12/7 9:45 AM] Tom Hoby (Guest)
Tom Hoby, Director of Open Space & Parks, Jefferson County

[12/7 9:45 AM] Chris Kampmann; City Of Arvada (Guest)
Chris Kampmann; City of Arvada, Water System Manager

[12/7 9:46 AM] Nancy Balter (Guest)
Nancy Balter - community representative Jeffco Wildfire Mitigation Task Force

[12/7 9:46 AM] Unknown User Jason Slowinski left the conversation.

[12/7 9:47 AM] Will Truesdale (Guest)
Joe Manchen, Road and Bridge, District Supervisor Senior

[12/7 9:47 AM] Unknown User Donald Davis joined the meeting.

[12/7 9:52 AM] Unknown User Joe Manchen joined the meeting.

[12/7 9:52 AM] Unknown User John Carson (Guest) left the conversation.

[12/7 9:52 AM] Unknown User Brian Maillett (Guest) joined the meeting.

[12/7 10:01 AM] Unknown User John Carson (Guest) left the conversation.

[12/7 10:02 AM] Unknown User Brian Maillett (Guest) left the conversation.

[12/7 10:03 AM] Unknown User John Carson (Guest) joined the meeting.

[12/7 10:05 AM] John Putt (Guest)
John Putt: Upper Bear Creek CWPIP Leader Jeffco EOC ESF 4 A&B

[12/7 10:07 AM] John Carson (Guest)
John Carson Eldorado Canyon State Park

[12/7 10:07 AM] Joe Manchen (Guest)
Joe Manchen, Jefferson County Road & Bridge Senior Supervisor District 1

[12/7 10:08 AM] Kyle Beck (Guest)
Kyle Beck Lakewood Street Maintenance-Public Works

[12/7 10:09 AM] Unknown User John Putt left the conversation.

[12/7 10:09 AM] Unknown User John Putt joined the meeting.

[12/7 10:11 AM] Jill Fraser (Guest)
I see that cyber/information security was not a hazard identified in the previous plan. I understand this is an effort focused on Natural Disasters so I am just trying to understand how/if you all believe information security should be included as a part of this planning effort. Thanks.

[12/7 10:13 AM] Unknown User Leif Carlson has left the meeting.

[12/7 10:15 AM] Kris Wahlers - Chatfield SP (Guest)
Please include CPW as an interested jurisdiction. We have 4 State Parks and other State Wildlife Areas within JeffCo. What about federal land managers, especially regarding wildfire risks?

[12/7 10:15 AM] Kris Wahlers - Chatfield SP (Guest)

haha, there we are!

[12/7 10:17 AM] Erika Roberts (Guest)

"Man-made" disasters can be included. We are very interested in exploring adding cyber, as well as, public health/pandemic. Our next meeting we will focus on hazards and risks. I dont believe "man-made" mitigation projects are eligible for mitigation dollars @jillfraser

[12/7 10:20 AM] Mark Thompson (Guest)

Erika, you're correct about funding eligibility- as of now. This year has raised the question about adding pandemic/epidemic to eligible hazards but who knows.

[12/7 10:21 AM] Unknown User pgavelda (Guest) joined the meeting.

[12/7 10:22 AM] Mark Thompson (Guest)

Regarding cyber/IT and other non-natural hazards. FEMA funding won't pay for cyber mitigation, for example, but you could mitigate your IT facilities from other hazards.

[12/7 10:23 AM] Unknown User Mark Thompson (Guest) left the conversation.

[12/7 10:23 AM] Unknown User Ben Irwin left the conversation.

[12/7 10:23 AM] Unknown User Kate Newman joined the meeting.

[12/7 10:23 AM] Unknown User Ben Irwin joined the meeting.

[12/7 10:24 AM] Jill Fraser (Guest)

what risk framework is used - is the FAIR framework used to communicate risk?

[12/7 10:25 AM] Unknown User Michael Dobbs has left the meeting.

[12/7 10:27 AM] Unknown User Gilpin OEM left the conversation.

[12/7 10:29 AM] Unknown User Bruce Benninghoff (Guest) joined the meeting.

[12/7 10:29 AM] Unknown User JD Jepkema (Guest) joined the meeting.

[12/7 10:33 AM] Lesley Dahlkemper (Guest)

Erika and Scott, it would be helpful to share an overview of this work with the Jeffco wildfire task force at our upcoming Jan. 21 or Feb. 18 meeting. Erika, we can talk more offline too! Thanks

[12/7 10:34 AM] Lesley Dahlkemper (Guest)

^^ This is Lesley - I'm clearly NOT proficient at the Microsoft Team web platform. :-)

[12/7 10:36 AM] Unknown User Todd Farrow - CPW (Guest) left the conversation.

[12/7 10:41 AM] Unknown User Banks, Brian -FS joined the meeting.

[12/7 10:45 AM] Cindy Latham (Guest)

Missing: Colorado State Forest Service. Also missing Upper South Platt Partnership

[12/7 10:46 AM] Mark Forgy - IHFR (Guest)

DFPC

[12/7 10:46 AM] Cindy Latham (Guest)

Missing some of the local water municipal districts -- like Evergreen

[12/7 10:47 AM] Moser, Greg (Guest)
Clear Creek Watershead Association? Ditch companies?

[12/7 10:47 AM] Jill Fraser (Guest)
If we choose to include IT we will want to add IT representation from the representative organizations.

[12/7 10:49 AM] Kevin Stewart (Guest)
CRS Activity 610 (Flood Warning) is another credit Jeffco should quality for.

[12/7 10:49 AM] Unknown User Suzanne Boccia, Clear Creek EM (Guest) joined the meeting.
[12/7 10:50 AM] Unknown User JD Jepkema (Guest) left the conversation.

[12/7 10:53 AM] Chambers, Mack
does JeffCo have warning sirens in a GIS?

[12/7 10:55 AM] Brislawn, Jeff P
I know Wheat Ridge does

[12/7 10:55 AM] Jesse Miller (Guest)
Lakewood and Wheat Ridge have warning sirens, I can provide their locations

[12/7 10:55 AM] Chambers, Mack
thank you!

[12/7 10:57 AM] Unknown User Guest left the conversation.
[12/7 10:58 AM] Unknown User Nancy Balter (Guest) left the conversation.
[12/7 10:59 AM] Unknown User Suzanne Boccia, Clear Creek EM (Guest) left the conversation.

[12/7 11:06 AM] Brislawn, Jeff P
Thanks for sharing that link Commissioner!

[12/7 11:06 AM] Unknown User Anne Beierle left the conversation.
[12/7 11:06 AM] Unknown User pgavelda (Guest) left the conversation.
[12/7 11:07 AM] Unknown User John Carson (Guest) left the conversation.
[12/7 11:07 AM] Unknown User Cindy Latham (Guest) left the conversation.
[12/7 11:07 AM] Unknown User John Putt left the conversation.
[12/7 11:07 AM] Unknown User Damian DiFeo (Guest) left the conversation.
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[12/7 11:07 AM] Unknown User Daniel Battin (Guest) left the conversation.
[12/7 11:07 AM] Unknown User pgavelda (Guest) joined the meeting.
[12/7 11:07 AM] Unknown User Kara (Guest) left the conversation.
[12/7 11:07 AM] Unknown User Kris Wahlers - Chatfield SP (Guest) left the conversation.
[12/7 11:07 AM] Unknown User Chris Kampmann; City Of Arvada left the conversation.
[12/7 11:07 AM] Unknown User Erika Roberts (Guest) left the conversation.
[12/7 11:07 AM] Unknown User Becky Baker (Guest) left the conversation.
[12/7 11:07 AM] Unknown User Ben Irwin left the conversation.

[12/7 11:07 AM] Banks, Brian -FS (Guest)
Nice work!

[12/7 11:07 AM] Unknown User Rachel Rush-Evergreen Fire Rescue (Guest) left the conversation.

[12/7 11:07 AM] Unknown User Jim Kirch - CO Dam Safety (Guest) left the conversation.

[12/7 11:07 AM] Chris OKeefe (Guest)

Thank you!

[12/7 11:07 AM] Unknown User Chris Nicholas (Guest) left the conversation.

[12/7 11:07 AM] Unknown User Curt Rogers left the conversation.

[12/7 11:07 AM] Unknown User Mark Forgy - IHFR (Guest) left the conversation.

[12/7 11:07 AM] Unknown User Skip Shirlaw (Guest) left the conversation.

[12/7 11:07 AM] Unknown User Melissa Ryder (Arvada) (Guest) left the conversation.

[12/7 11:08 AM] Unknown User Eric Lewin (Guest) left the conversation.

[12/7 11:08 AM] Michele Robbins (Guest)

thanks so much!

[12/7 11:08 AM] Unknown User Banks, Brian -FS left the conversation.

[12/7 11:08 AM] Unknown User garrett stephens (Guest) left the conversation.

[12/7 11:08 AM] Audrey Prince (Guest)

thank you, can you forward the slides?

[12/7 11:08 AM] pgavelda (Guest)

Thanks Erika, Scott, and Jeff!

[12/7 11:08 AM] Field, Scott

Yes we will be making the slides available and will send that link to all participants.

[12/7 11:09 AM] Unknown User pgavelda (Guest) left the conversation.

[12/7 11:10 AM] Unknown User Ike Miller (Guest) left the conversation.

[12/7 11:10 AM] Unknown User Paul Amundson left the conversation.

[12/7 11:10 AM] Unknown User Brennan Middleton (Guest) left the conversation.

[12/7 11:19 AM] Unknown User Zach Taylor CPW (Guest) left the conversation.

[12/7 11:21 AM] Unknown User J Puhr Golden, CO (Guest) left the conversation.

[12/7 11:27 AM] Unknown User Alicia Welch left the conversation.

[12/7 11:47 AM] Unknown User Andy Stewart (Guest) joined the meeting.

[12/7 11:48 AM] Unknown User Andy Stewart (Guest) left the conversation.

[12/7 11:59 AM] Brian Bishop (Guest) left the conversation.

[12/7 1:28 PM] Donald Davis (Guest)

A cyber attack is an existential threat to the county and keeps me up at night. Definitely an area we need to be prepared for and take extensive mitigation efforts on.

Meeting ended 12/7 11:59 AM

Jefferson County

Hazard Mitigation Plan Update

Risk Assessment Webinar Agenda

Date: Monday, January 11, 2021
9:30 – 11:30 pm MST

Meeting at: Microsoft Teams meeting
[Click here to join the meeting](https://bit.ly/2W6CDsh)
<https://bit.ly/2W6CDsh>
[+1 281-810-1627](tel:+12818101627) United States, Houston
(Toll)
[\(866\) 670-1764](tel:+18666701764) United States (Toll-free)
Conference ID: 516 045 006#

Subject/Purpose

The purpose of the meeting is to review the highlights of the updated Hazard Identification and Risk Assessment. The meeting will be delivered as a webinar due to the COVID-19 pandemic and social distancing requirements.

Attendees: Hazard Mitigation Planning Committee, Stakeholders and Consultant Team

1. Introductions
2. Review of the planning process
3. Update on public involvement activities
4. Plan update guide
5. Review of hazards and vulnerability assessment update
6. Updating mitigation goals
7. Next steps
8. Questions and answers

Jefferson County Multi-Jurisdictional Hazard Mitigation Plan 2021 Update

HIRA Webinar Summary January 11, 2021, 9:30 AM – 12:00 PM

Introductions and Opening Remarks

This document summarizes the hazard identification and risk assessment meeting for the Jefferson County Hazard Mitigation Plan (HMP) update for 2021. The virtual meeting was facilitated by Wood Environment & Infrastructure Solutions, Inc. (Wood), the consultant firm hired to facilitate the planning process and develop the updated multi-jurisdictional plan. This type of meeting is ideally conducted in-person, however in this instance the meeting was held virtually to comply with social distancing requirements as a result of the COVID-19 pandemic. Scott Field, Project Manager at Wood, began the meeting with introductions. Eighty-one individuals attended the webinar representing a mix of the consultant team, County department representatives, participating jurisdictions, and various stakeholders.

The key discussion is summarized below, and the webinar chat log is attached at the end. Additional details can be found in the meeting PowerPoint presentation and webinar recording.

Review of the Hazard Mitigation Planning Process

Following introductions, Scott Field reviewed the planning process being followed and discussed the project status and progress made thus far.

Update on Public Involvement Activities/public meeting.

Scott noted that the online public survey is open through the end of January, and has already received 431 responses. The HMPC is encouraged to share the link to the public survey through their respective channels: <http://bit.ly/JeffCOHMP>

The first public meeting will be held virtually on January 14, 2021 from 5:30-7:30 pm. A sample press release was provided so it could be shared with their PIOs.

Risk Assessment Presentation and Discussion

The general risk assessment requirements were outlined before turning to a detailed discussion of each hazard. Highlights were presented on each hazard included in the updated risk assessment chapter of the plan. Refer to the Jefferson County HMP Risk Assessment PowerPoint presentation for specific details on

each hazard and a handout summarizing hazard significance. Highlights of the discussion are noted by hazard in the table below.

Hazard or Topic	Meeting Discussion and Problem Statements
Avalanche	<ul style="list-style-type: none"> No comments
Flood	<ul style="list-style-type: none"> Caitlin Long, City of Lakewood, asked about examining climate models and flooding impacts on vulnerable populations
Dam Failure/Incident	<ul style="list-style-type: none"> No comments
Tornado	<ul style="list-style-type: none"> No comments
Windstorm	<ul style="list-style-type: none"> No comments
Hail	<ul style="list-style-type: none"> No comments Jeff Brislaw, Wood E&IS, mentioned the economic impacts to the Colorado Mills damage from the 2017 hail event
Winter Storm	<ul style="list-style-type: none"> No comments
Extreme Temperatures	<ul style="list-style-type: none"> Heat – Caitlin Long: interplay with air quality and extreme heat. Low income populations without AC and only access to swamp coolers or windows to cool house. Combining bad air quality with extreme heat can create a dangerous situation Cold – Caitlin Long: low income population may be unable to afford adequate heating for extended periods of cold
Drought	<ul style="list-style-type: none"> Bob Heine, Lookout Mountain Water, stated that they would be declaring a drought emergency. Asked if buying senior water rights could be considered a mitigation action. Mentioned that reservoir levels have been dropping for the past 5 years because of water rights seniorities. Chris O’Keefe, Jefferson County Planning Director, mentioned Jeffco’s water smart program, here are some recent policy changes to our comp plan as a result of the program: https://www.jeffco.us/2584/Plan-Updates
Wildfire	<ul style="list-style-type: none"> Jefferson County Conservation District – Several CWPPs have been updated, neighborhood level data may have changed. Cindy Latham provided link to Evergreen CWPP - https://foreststewardsguild.org/wp-content/uploads/2020/06/Evergreen-CWPP.pdf Bob Heine asked if expanding hydrants or pipeline network could be considered a mitigation action
Earthquake	<ul style="list-style-type: none"> No Comments
Geologic Hazards	<ul style="list-style-type: none"> Pat O’Connell, Jefferson CO floodplain manager, mentioned there was a county wide expansive soils map which he would send.
Human-Caused Hazards	<ul style="list-style-type: none"> Pandemic – No Comments Cyber Attack – No Comments
Other/General	<ul style="list-style-type: none"> Cindy Latham with Jefferson County Wildfire Risk Reduction Task Force asked if the planning team looked at issues and concerns on the County’s emergency notification system (CodeRED), stating there are significant community and fire department concerns about CodeRED. Wood will take a look at his and see how it might fit into the updated plan.

Review of Mitigation Goals

Scott gave a brief overview of the mitigation goals, objectives, and actions, from the 2016 plan. A survey will be sent out to participants in the coming weeks asking for input on verifying or revising the goals and objectives, as well as updating the status of the actions from the 2016 Plan.

Next Steps

The project schedule was reviewed:

<u>Project Milestone</u>	<u>Anticipated Timeline</u>
• HMPC Meeting #2 – HIRA Review	January 2021
• HMPC Meeting #3 – Mitigation Goals	February 2021
• 2 Public Workshops	Jan & April 2021
• Updated HIRA	February 2021
• HMPC Review Draft	Mid-March 2021
• Public Review Draft	Early April 2021
• CO DHSEM Review	April 2021
• Final Plan for FEMA Review (estimated)	May 2021
• FEMA Review (estimated)	May-June 2021
• Final Approved HMP for local adoption	July 2021

Initial information needs and next steps were discussed. Wood will be sending a Plan Update Guide requesting input on:

- Recent hazard events (since 2016)
- Growth and development trends
- Recent updated plans and policies

Each participating jurisdiction needs to complete and return the guide by January 31st.

Adjourn

The meeting adjourned at 12:02 pm

Jefferson County Hazard Mitigation Plan 2021 Update

Hazard Identification and Risk Assessment Meeting Chat Log

[9:06 AM] Anne Beierle joined the meeting.
[9:06 AM] Anne Beierle (Guest) joined the meeting.
[9:20 AM] Ed Peck joined the meeting.
[9:20 AM] Joe Manchen joined the meeting.
[9:20 AM] Erika Roberts (Guest) joined the meeting.
[9:22 AM] Alan Fletcher joined the meeting.
[9:22 AM] Mark Westberg joined the meeting.
[9:23 AM] Carr, Amy joined the meeting.
[9:24 AM] Alan Anderson Foothills Fire (Guest) joined the meeting.
[9:25 AM] Cindy Latham (Guest) joined the meeting.
[9:25 AM] Curt Rogers joined the meeting.
[9:25 AM] Joe Snyder joined the meeting.
[9:25 AM] Jim Haselgren joined the meeting.
[9:25 AM] Alan Anderson Foothills Fire (Guest) left the conversation.
[9:26 AM] Chris Nicholas (Guest) joined the meeting.
[9:27 AM] Alan Anderson joined the meeting.
[9:27 AM] Robbins Bill joined the meeting.
[9:27 AM] Jesse Miller joined the meeting.
[9:27 AM] Vince Casteel joined the meeting.
[9:27 AM] Keith Hensel joined the meeting.
[9:27 AM] Brislawn, Jeff P joined the meeting.

[9:27 AM] Field, Scott

Thank you for joining us this morning. We'll be getting started here in a few minutes.

[9:27 AM] Robert Ipatenco joined the meeting.
[9:27 AM] Will Truesdale (Guest) joined the meeting.
[9:27 AM] Chris OKeefe joined the meeting.
[9:27 AM] Shelley E. Cobau joined the meeting.
[9:28 AM] Fey, Clint joined the meeting.
[9:28 AM] Andy Stewart (Guest) joined the meeting.
[9:28 AM] Kit Lammers joined the meeting.
[9:28 AM] Hal Grieb JeffCo EM (Guest) joined the meeting.
[9:28 AM] Franco, Rebecca J. joined the meeting.
[9:28 AM] Jim King (Guest) joined the meeting.
[9:28 AM] Chris Kampmann; City of Arvada (Guest) joined the meeting.
[9:28 AM] DeAndrea Madalena joined the meeting.
[9:28 AM] Anne Heine joined the meeting.
[9:28 AM] Pat OConnell joined the meeting.
[9:29 AM] Izabela Petrykowska, Arvada Economic Development (Guest) joined the meeting.

[9:29 AM] Erika Roberts (Guest)

Scott - a number of folks are joining over the phone. Will you remind people on the phone to email me to ensure we have them documented as a participant?

[9:29 AM] Mark Forgy - IHFR (Guest) joined the meeting.
[9:29 AM] Kris Wahlers - Chatfield SP (Guest) joined the meeting.
[9:29 AM] Paul Amundson (Guest) joined the meeting.
[9:29 AM] Gerald Bader joined the meeting.

[9:29 AM] Becky Baker (Guest) joined the meeting.
[9:29 AM] Johnson, Christopher A joined the meeting.
[9:29 AM] Mark Thompson (Guest) joined the meeting.
[9:29 AM] Skip Shirlaw (Guest) joined the meeting.
[9:29 AM] Alicia Welch joined the meeting.
[9:29 AM] Anne Beierle (Guest) joined the meeting.
[9:29 AM] Brycen Hammer joined the meeting.
[9:29 AM] Michael Hendershot joined the meeting.
[9:29 AM] Chambers, Mack joined the meeting.
[9:30 AM] Bailey Becker joined the meeting.
[9:30 AM] Andy Stewart - City of Arvada (Guest) joined the meeting.
[9:30 AM] Bob Heine (Guest) joined the meeting.
[9:30 AM] Andre Jaen joined the meeting.
[9:30 AM] Brennan Middleton (Guest) joined the meeting.
[9:30 AM] Nancy Balter (Guest) joined the meeting.
[9:30 AM] Stephens, Garrett - NRCS, Denver, CO joined the meeting.
[9:30 AM] Damian DiFeo joined the meeting.
[9:30 AM] Bob Heine (Guest) left the conversation.
[9:31 AM] Steve Durian joined the meeting.
[9:31 AM] Melissa Ryder (Arvada) (Guest) joined the meeting.
[9:31 AM] Rachel Rush-Evergreen Fire Rescue (Guest) joined the meeting.
[9:31 AM] Ben Irwin (Guest) joined the meeting.
[9:31 AM] Beckman, Nathan joined the meeting.
[9:32 AM] Mari Johnson joined the meeting.
[9:32 AM] pgavelda (Guest) joined the meeting.
[9:32 AM] Jason Puffett joined the meeting.

[9:32 AM] Hal Grieb JeffCo EM (Guest)
DITTO!

[9:32 AM] Zach Taylor CPW (Guest) joined the meeting.
[9:32 AM] Caitlin Hasenbalg Long joined the meeting.
[9:33 AM] Ken Perry joined the meeting.

[9:33 AM] pgavelda (Guest)
Hurray for Project Impact!

[9:33 AM] Jill Fraser joined the meeting.
[9:33 AM] Kirk Lock joined the meeting.
[9:35 AM] Unknown User Bob Heine (Guest) joined the meeting.
[9:35 AM] Unknown User Chris Kampmann; City of Arvada (Guest) joined the meeting.
[9:35 AM] Unknown User Joe Puhr joined the meeting.

[9:35 AM] Erika Roberts (Guest)
Erika Roberts, Jefferson County Sheriff's Office, Emergency Management

[9:36 AM] Unknown User Bob Heine (Guest) left the conversation.

[9:36 AM] Vince Casteel
Vince Casteel, Cir

[9:36 AM] Erika Roberts (Guest)
Ron Celentano, Jefferson County Sheriff's Office, Emergency Management

[9:37 AM] Vince Casteel
Vince Casteel, City of Lakewood Public Works

[9:37 AM] Unknown User Perri, Andrew D. - DPR CA1714 Program Manager joined the meeting.

[9:38 AM] Anne Heine
Anne Heine, Lakewood Public Works

[9:38 AM] Unknown User Chris Kampmann; City of Arvada (Guest) left the conversation.
[9:38 AM] Unknown User Ravage (Guest) joined the meeting.

[9:38 AM] Brislawn, Jeff P
Jeff Brislawn, Hazard Mitigation Lead, Wood

[9:38 AM] Mark Thompson (Guest)
Mark Thompson, DHSEM Mitigation

[9:39 AM] Unknown User Audrey Prince joined the meeting.
[9:40 AM] Unknown User Zach Taylor CPW (Guest) left the conversation.
[9:40 AM] Unknown User pgavelda (Guest) left the conversation.
[9:40 AM] Unknown User pgavelda (Guest) joined the meeting.
[9:40 AM] Unknown User Michael Dobbs joined the meeting.
[9:41 AM] Unknown User Nancy Balter (Guest) left the conversation.
[9:41 AM] Unknown User Kym Sorrells joined the meeting.
[9:42 AM] Unknown User Nancy Balter (Guest) joined the meeting.
[9:43 AM] Unknown User Andy Stewart - Ciy of Arvada (Guest) left the conversation.
[9:43 AM] Unknown User Andy Stewart - Ciy of Arvada (Guest) joined the meeting.
[9:43 AM] Unknown User Andy Stewart - Ciy of Arvada (Guest) left the conversation.
[9:44 AM] Unknown User Andy Stewart (Guest) joined the meeting.
[9:44 AM] Unknown User John Putt joined the meeting.

[9:44 AM] Cindy Latham (Guest)
2020 Bailey, Evergreen Community Wildfire Protection Plans -- Hazard Identification

[9:44 AM] Paul Amundson (Guest)
CWPP's

[9:44 AM] Beckman,Nathan
CSFS 2020 Forest Action Plan

[9:45 AM] Caitlin Hasenbalg Long
Lakewood Sustainability Plan and Lakewood Community Resources Master Plan:
<https://www.lakewood.org/Government/Departments/Planning/Comprehensive-Planning-Main/Community-Plans#section-3>

[9:47 AM] Unknown User Scott (Guest) joined the meeting.

[9:47 AM] Carr, Amy
<https://bit.ly/JeffCOHMP>
Fill | Jefferson County Hazard Mitigation Plan Update Public Input Survey
Jefferson County is updating its Multi-Jurisdictional Hazard Mitigation Plan per the five year update cycle required by FEMA and the Federal Disaster Mitigation Act of 2000. The Hazard Mitigation...
bit.ly

[9:47 AM] Alicia Welch
CO Homeland Security Strategy: A Safe, Prepared and Resilient CO (2019-2023)

[9:47 AM] Unknown User Joe Snyder has left the meeting.

[9:48 AM] Erika Roberts (Guest)
Help the JCSO Emergency Management team prepare for disasters and emergencies!
Please take our short 5 question HMP Survey at <http://bit.ly/JeffCOHMP> today!
Jefferson County is updating our Multi-Jurisdictional Hazard Mitigation Plan (HMP) to help us · Prepare for natural disasters · Prepare for human-caused hazards · Identify ways to reduce losses · Protect our community from hazardous events
We need your input to help us better understand our vulnerabilities, your experiences, and opportunities to reduce the impacts of hazards before they occur.
This is posted on all of the Sheriffs Office social media accounts as well. Feel free to share!!
Leaving Facebook
l.facebook.com

[9:48 AM] Mark Westberg
Can you send us a sample press release that we can share with our PIOs?

[9:48 AM] Unknown User Bob Heine (Guest) joined the meeting.

[9:48 AM] Unknown User Bob Heine (Guest) left the conversation.

[9:50 AM] Unknown User Greg Moser-Westminster (Guest) joined the meeting.

[9:50 AM] Unknown User Lyle Laverty joined the meeting.

[9:50 AM] Unknown User Lesley Dahlkemper joined the meeting.

[9:52 AM] Unknown User Joe Snyder joined the meeting.

[9:52 AM] Unknown User Franco, Rebecca J. left the conversation.

[9:55 AM] Unknown User Paul Amundson (phone) joined the meeting.

[9:56 AM] Unknown User Paul Amundson (Guest) left the conversation.

[9:56 AM] Unknown User Grey La Certe joined the meeting.

[10:01 AM] pgavelda (Guest)
Apologies - I need to jump off to another meeting. Thank you.

[10:01 AM] Unknown User Brady, Cynthia A joined the meeting.

[10:01 AM] pgavelda (Guest)
Love your HMP Update Guide!

[10:01 AM] Unknown User pgavelda (Guest) left the conversation.

[10:01 AM] Erika Roberts (Guest)
Grey La Certe, DHSEM RFM

[10:01 AM] Unknown User Franco, Rebecca J. joined the meeting.

[10:03 AM] Unknown User Nathaniel J Whittington joined the meeting.

[10:06 AM] Unknown User Dylan Monke joined the meeting.

[10:08 AM] Cindy Latham (Guest)
Do you look at issues and concerns on the Emergency Notification System (CodeRED) ?

[10:08 AM] Field, Scott
[JeffCo Plan Update Guide -Stakeholder.docx]

[https://woodplc-my.sharepoint.com/personal/scott_field_woodplc_com/Documents/Microsoft Teams Chat Files/JeffCo Plan Update Guide -Stakeholder.docx](https://woodplc-my.sharepoint.com/personal/scott_field_woodplc_com/Documents/Microsoft%20Teams%20Chat%20Files/JeffCo%20Plan%20Update%20Guide%20-%20Stakeholder.docx)

[10:09 AM] Unknown User Scott (Guest) left the conversation.

[10:09 AM] Unknown User Kevin Stewart joined the meeting.

[10:09 AM] Unknown User Scott (Guest) joined the meeting.

[10:10 AM] Unknown User Brady, Cynthia A left the conversation.

[10:10 AM] Unknown User Brady, Cynthia A joined the meeting.

[10:19 AM] Carr, Amy

Hi Cindy Latham (Guest) , we don't usually include analysis related to issues with Emergency Notification Systems but it is something we can mention in the plan if it is a concern for the communities.

Do you have any specific issues or concerns about the EM Notification System that the planning team should be aware of?

[10:22 AM] Mark Westberg

Wheat Ridge maps have been updated since 1972.

[10:23 AM] Chambers, Mack

Thank you for this observation, we need to update that table. Other jurisdictions have updated as well.

[10:24 AM] Cindy Latham (Guest)

Carr, Amy -- yes there are significant community concerns about CodeRED -- with several major failures to notify including the Elephant Butte fire. This is not just a community concern, but a fire department concern as well.

[10:24 AM] Carr, Amy

Apologizes, Mark Westberg , that was a typo. We have 2/5/2014 as the current map date (according to FEMA Community Information Systems website). We will make sure that is correct in the plan. Thanks for the input!

[10:25 AM] Mark Westberg

JeffCo jurisdictions rock

[10:32 AM] Carr, Amy

Thanks for sharing Cindy Latham (Guest)

[10:33 AM] Erika Roberts (Guest)

Field, Scott no vacuum noise on our end

[10:44 AM] Unknown User John Carson (Guest) joined the meeting.

[10:47 AM] Lesley Dahlkemper

Great info so far - much appreciated - thank you!

[10:50 AM] Alicia Welch

Can Wood make these slides available to the participants please?

[10:51 AM] Erika Roberts (Guest)

Alicia Welch Absolutely. We plan to send them out to the group with the recording.

[10:59 AM] Unknown User Ben Irwin (Guest) left the conversation.

[11:01 AM] Carr, Amy

Thanks for sharing Chris OKeefe!

[11:02 AM] Unknown User Brady, Cynthia A left the conversation.

[11:06 AM] Cindy Latham (Guest)

<https://foreststewardsguild.org/wp-content/uploads/2020/06/Evergreen-CWPP.pdf>

[11:07 AM] Lesley Dahlkemper

Compelling, sobering visual re: number of potential crown fires

[11:27 AM] Unknown User Franco, Rebecca J. left the conversation.

[11:27 AM] Unknown User Cindy Latham (Guest) left the conversation.

[11:28 AM] Unknown User Brennan Middleton (Guest) left the conversation.

[11:28 AM] Unknown User Grey La Certe left the conversation.

[11:31 AM] Carr, Amy

Public Survey Link to share: <https://bit.ly/JeffCOHMP>

[11:31 AM] Kit Lammers

Will you be sending out the link to the public meeting and other material for us to promote that?

[11:32 AM] Unknown User Andy Stewart (Guest) left the conversation.

[11:32 AM] Alan Fletcher

Thank you.

[11:32 AM] Unknown User Izabela Petrykowska, Arvada Economic Development (Guest) left the conversation.

[11:32 AM] Unknown User Anne Beierle (Guest) left the conversation.

[11:32 AM] Joe Manchen

Thank You

[11:32 AM] Joe Snyder

Thank you

[11:33 AM] Caitlin Hasenbalg Long

Thanks!

[11:33 AM] Unknown User Kris Wahlers - Chatfield SP (Guest) left the conversation.

[11:33 AM] Unknown User Hal Grieb JeffCo EM (Guest) left the conversation.

[11:33 AM] Unknown User Erika Roberts (Guest) left the conversation.

[11:33 AM] Unknown User Mark Thompson (Guest) left the conversation.

[11:33 AM] Unknown User Melissa Ryder (Arvada) (Guest) left the conversation.

[11:33 AM] Unknown User Mark Forgy - IHFR (Guest) left the conversation.

[11:33 AM] Unknown User Becky Baker (Guest) left the conversation.

[11:33 AM] Unknown User Stephens, Garrett - NRCS, Denver, CO left the conversation.

[11:33 AM] Unknown User Jim King (Guest) left the conversation.

[11:33 AM] Unknown User Curt Rogers left the conversation.

[11:33 AM] Unknown User Chris Nicholas (Guest) left the conversation.

[11:33 AM] Unknown User John Carson (Guest) left the conversation.

[11:33 AM] Unknown User Paul Amundson (phone) left the conversation.

[11:33 AM] Unknown User Rachel Rush-Evergreen Fire Rescue (Guest) left the conversation.

[11:33 AM] Unknown User Skip Shirlaw (Guest) left the conversation.

[11:33 AM] Unknown User Nathaniel J Whittington left the conversation.

[11:33 AM] Shelley E. Cobau

Thanks so much!

[11:33 AM] Unknown User Robert Ipatenco has left the meeting.

[11:34 AM] Field, Scott

Thank you all for your time and participation!

[11:34 AM] Unknown User Will Truesdale (Guest) left the conversation.

[11:36 AM] Unknown User Greg Moser-Westminster (Guest) left the conversation.

[11:36 AM] Unknown User Ravage (Guest) left the conversation.

[11:36 AM] Unknown User Scott (Guest) left the conversation.

[11:37 AM] Unknown User John Putt left the conversation.

[11:38 AM] Unknown User Chris Kampmann; City of Arvada (Guest) left the conversation.

Meeting Ended 2h 42m [12:02 PM]

Jefferson County

Hazard Mitigation Plan Update

Mitigation Strategy Meeting Agenda

Date: Thursday, February 11, 2021
9:30 – 11:30 pm MST

Meeting at: Microsoft Teams meeting
[Click Here to Join the Meeting](https://bit.ly/3oDUyDh)
<https://bit.ly/3oDUyDh>
[+1 281-810-1627](tel:+12818101627) United States, Houston
(Toll)
[\(866\) 670-1764](tel:+18666701764) United States (Toll-free)
Conference ID: 852 308 533#

Subject/Purpose

This meeting will focus on updating the plan's mitigation strategy, including the plan's goals and objectives, actions undertaken since the last plan update, and identifying new mitigation activities. All participating jurisdictions and planning team members are encouraged to attend. The meeting will be delivered as a webinar due to the COVID-19 pandemic and social distancing requirements.

Attendees: Hazard Mitigation Planning Committee, Stakeholders and Consultant Team

1. Introductions
2. Review of the Planning Process and Progress to Date
3. Update Mitigation Goals & Objectives
4. Review of progress on Mitigation Actions from 2016 Plan
5. Review of Mitigation Action Categories
6. Development of New Mitigation Actions
7. Next steps
8. Questions and Answers

Jefferson County Multi-Jurisdictional Hazard Mitigation Plan 2021 Update

Mitigation Strategy Webinar February 11, 2021, 9:30 – 11:30 AM

Introductions and Opening Remarks

Scott Field, Project Manager, Wood Environment and Infrastructure Solutions (Wood), kicked off the webinar and thanked everyone for their participation. Scott introduced the Wood team and led a roll call of attendees to introduce themselves. In total 69 individuals participated in the webinar representing Jefferson County and participating jurisdictions including municipalities and special districts as well as stakeholders and partner organizations.

Review of the Planning Process and Progress to Date

The FEMA planning process steps were recapped; Wood is currently wrapping up the Risk Assessment process and beginning the mitigation strategy portion. This webinar addressed mitigation strategizing and goal review/development aspects.

The roles of the participating jurisdictions in the HMPC vs. Stakeholders were reviewed, as differentiated under FEMA's eyes. Only the participating jurisdictions, will be specifically addressed in the plan and will be required to meet certain criteria such as attending planning meetings, identifying mitigation actions, and tracking other aspects in order to qualify for funding in the future. While other entities (i.e. everyone else) were key stakeholders that would provide useful input and feedback as well as review the Hazard Mitigation Plan (HMP) drafts.

The progress on the plan update process to date was reviewed. Highlights include:

- Kickoff meeting held December 7th
- Risk Assessment meeting held January 11th
- First public meeting held January 14th
- Online Public Survey closed January 31st
- HIRA Update Ongoing

Update on Public Involvement Activities/public meeting.

Scott noted that the online public survey is closed on January 31st and received 953 responses. The top five hazards of concern based on this public survey were:

- Wildfire
- Drought
- Hailstorm
- Pandemic

- Windstorm

There was some discussion amongst the committee concerning how the survey was distributed. Erika Roberts with Jefferson County explained that it was pushed out through the networks of the HMPC participants. Jill Fraser, BIT Chief Information Security Officer for Jefferson County, added that she felt if cyber threats were going to be included as a hazard then the committee should look to include more technology personnel from the county.

Mitigation Goals and Objectives

The goals from the 2016 Hazard Mitigation Plan were revisited and results from the Webinar #2 Post Meeting Summary was discussed. Key differences between “goals,” “objectives” and “actions” were defined: goals and objectives are usually more general and broad guidelines while actions are specific and project-driven. Projects submitted for grant funding will need to tie back to goals and objectives in the HMP. The revised 2021 Jefferson County Hazard Mitigation Plan goals and objectives are as follows. Proposed revisions are underlined.

Goals:

- Goal 1: Increase public education and awareness about natural and human-caused hazards and how to mitigate against them.
- Goal 2: Reduce impacts of natural hazards on life, property, and the environment (or improve the community’s resilience to...).
- Goal 3: Strengthen and develop partnerships in regards to mitigating hazard impacts.

Objectives:

- 1) Goal 1 Objectives:
 - a) Create a (or continue/enhance) public outreach effort on the hazards identified in this plan.
 - b) Improve plans, procedures, and systems for public notification and warning.
 - ~~c) Provide timely notification and direction to the public of imminent and potential hazards.~~
 - d) ~~Provide notification for properties within hazard areas.~~
 - e) Provide education on (or encourage/incentivize/require) hazard resistant construction techniques.
 - f) Engage constituency to take personal responsibility for their own exposure and mitigation.
 - g) Increase public awareness of the need for funding for disaster mitigation & preparedness. (*“Not sure what this would accomplish?”*)
 - h) Understand the impacts of climate change on severity and frequency of hazards.
- 2) Goal 2 Objectives:
 - a) Improve wildfire education and training for dispatchers and emergency responders.
 - b) Establish safe refuge areas for wildfire evacuation.
 - c) More systemic preparation/adaptation to reduce more chronic but widespread impacts, such as strain on the power grid and premature aging of infrastructure.
 - d) Maintaining and strengthening existing natural systems/ecosystems/biodiversity to improve resilience in the event of a natural disaster
- 3) Goal 3 Objectives:
 - a) Promote planning efforts that foster cooperation and coordination among jurisdictions, agencies, and community aide organizations involved in hazard mitigation and response.
 - b) Maximize the use of shared resources and community resilience projects to leverage funding for hazard mitigation projects between all levels of government and the private sector.
 - c) Encourage coordination between mitigation efforts on public land and adjacent private properties.
 - d) Develop links between emergency planning and land/water use planning.

- e) Strengthen community partnerships to enhance the ability of local government to adapt to changing climate conditions and mitigate and respond to hazard events.
- f) Create a standing multi-jurisdictional hazard mitigation committee to provide mitigation fund governance, track plan implementation, and coordinate mitigation activities throughout the County.
- g) Implement the recommendations of the Wildfire Risk Reduction Task Force 2020 report.

For each of the goals and objectives, Scott highlighted the proposed changes and additions and led a discussion with the committee members. The committee was in general agreement that a major focus of the goals should be on public education, training, and outreach concerning hazards, specifically surrounding wildfire risks and evacuation routes. There was also a lengthy discussion concerning the divisiveness in public opinion surrounding the term climate change. General consensus among the committee members was that the topic of climate change should be addressed.

Mitigation Actions

Amy Carr lead a discussion on the Mitigation Actions portion of the plan. One way to think of mitigation actions is the four A's:

- Altering a hazard,
- Averting a hazard,
- Avoiding a hazard,
- Adapting to a hazard

FEMA suggests these four categories for mitigation actions:

- Plans and Regulations,
- Structure and Infrastructure Projects,
- Education and Awareness, and
- Natural Systems Protection.

Resources for more details on mitigation action types, categories, and example projects were provided, including a short discussion on climate change and adaptation considerations. Example hazard-specific mitigation projects were discussed including FEMA funding-eligible projects for winter weather, flood, and other hazards.

During the discussion Bob Heine, with the Lookout Mountain Water District, asked if there would be a provision for the expansion of water rights and water availability as a wildfire mitigation action.

Review of Progress on Existing Mitigation Actions

Prior to the webinar, a Mitigation Action Tracker was sent to the HMPC listing each jurisdictions' 2016 mitigation actions. Each HMPC representative was asked to provide status to provide comments on the status of each action. The Tracker was emailed again following the webinar to fill in some of the missing statuses, as some jurisdictions had not yet returned the Tracker at the time of the webinar. The mitigation action statuses are categorized as one of the following: Completed, Annual Implementation, In Progress, Not Started and Deleted.

Some examples of “Deleted” actions may be due to lack of project applicability over time, or even inability to complete a project in an area where the community does not have control/jurisdiction (e.g. state owned vs. federal land).

Annual Implementation are actions that a jurisdiction is conducting on an ongoing basis, but which the jurisdiction wants to continue forward into the updated plan to maintain visibility on the action.

Developing New Mitigation Actions

Each participating jurisdiction is required to develop at least one new action for the 2021 plan update. Ideally, jurisdictions should develop actions that address all the hazards addressed in the plan, or at least the High significance hazards, but FEMA Region VIII does not require this. All jurisdictions that participate in the National Flood Insurance Program (NFIP) will need to have a mitigation action addressing continued NFIP compliance.

The following are resources with ideas and examples of mitigation actions and implementation:

- FEMA’s ‘Mitigation Action Portfolio’ Publication: https://www.fema.gov/sites/default/files/2020-08/fema_mitigation-action-portfolio-support-document_08-01-2020_0.pdf
- DOLA ‘Planning for Hazard’ Guide: <https://planningforhazards.com/home>

A link to the New Mitigation Action Survey was shared during the meeting and emailed after. Each HMPC member was asked to fill out the survey with at least one mitigation action by February 26th.

New Mitigation Actions Survey: <http://bit.ly/JeffCoActions>

Next Steps

The project schedule was reviewed:

<u>Project Milestone</u>	<u>Anticipated Timeline</u>
• Updated HIRA	February 2021
• HMPC Review Draft	Mid-March 2021
• Public Review Draft	April 2021
• Public Meeting #2	April 2021
• CO DHSEM Review	Late April 2021
• Final Plan for FEMA Review (estimated)	May 2021
• FEMA Review (estimated)	May-June 2021
• Final Approved HMP for local adoption	July 2021

Adjourn

The meeting adjourned at 11:21 am

Jefferson County Hazard Mitigation Plan 2021 Update

Mitigation Strategy Meeting Chat Log

[9:25 AM] Unknown User Joe Puhr joined the meeting.
[9:26 AM] Unknown User Todd Hyatt joined the meeting.
[9:26 AM] Unknown User Carr, Amy joined the meeting.
[9:26 AM] Unknown User Alan Anderson joined the meeting.
[9:26 AM] Unknown User Curt Rogers joined the meeting.
[9:27 AM] Unknown User Alan Fletcher joined the meeting.
[9:27 AM] Unknown User Jesse Miller joined the meeting.

[9:24 AM] Field, Scott

Good morning everyone, thanks for joining us. We'll be getting started here in just a couple minutes.

[9:27 AM] Unknown User Jim King (Guest) joined the meeting.
[9:25 AM] Unknown User Johnson, Christopher A joined the meeting.
[9:26 AM] Unknown User Dorie Dalton joined the meeting.
[9:26 AM] Unknown User Joe Snyder joined the meeting.
[9:26 AM] Unknown User Bob Heine (Guest) joined the meeting.
[9:26 AM] Unknown User DeAndrea Madalena joined the meeting.
[9:27 AM] Unknown User Shelley E. Cobau joined the meeting.
[9:27 AM] Unknown User John Putt, Evergreen joined the meeting.
[9:27 AM] Unknown User Gerald Bader joined the meeting.
[9:27 AM] Unknown User Kris Wahlers - Chatfield SP (Guest) joined the meeting.
[9:27 AM] Unknown User Kurtis Behn joined the meeting.
[9:28 AM] Unknown User Andy Stewart (Arvada) (Guest) joined the meeting.
[9:28 AM] Unknown User Grey La Certe - DHSEM (Guest) joined the meeting.
[9:28 AM] Unknown User Andre Jaen joined the meeting.

[9:28 AM] Field, Scott

Good morning everyone, thanks for joining us. We'll be getting started here in just a couple minutes.

[9:28 AM] Unknown User Steve Durian joined the meeting.
[9:28 AM] Unknown User Banks, Brian -FS joined the meeting.
[9:29 AM] Unknown User Pat OConnell joined the meeting.
[9:29 AM] Unknown User Becky Baker joined the meeting.
[9:29 AM] Unknown User Fey, Clint joined the meeting.
[9:29 AM] Unknown User Erika Roberts (Guest) joined the meeting.
[9:29 AM] Unknown User Paul Amundson joined the meeting.
[9:29 AM] Unknown User Brislawn, Jeff P joined the meeting.
[9:29 AM] Unknown User Michael Hendershot joined the meeting.
[9:29 AM] Unknown User Stephens, Garrett - NRCS, Denver, CO joined the meeting.
[9:29 AM] Unknown User Alicia Welch joined the meeting.
[9:30 AM] Unknown User Robert Ipatenco joined the meeting.
[9:30 AM] Unknown User Franco, Rebecca J. joined the meeting.
[9:30 AM] Unknown User Jesse Daniel (Guest) joined the meeting.
[9:30 AM] Unknown User Jim Watt joined the meeting.
[9:30 AM] Unknown User Paul Amundson joined the meeting.
[9:30 AM] Unknown User Paul Amundson left the conversation.
[9:30 AM] Unknown User Perri, Andrew D. - DPR CA1714 Program Manager joined the meeting.
[9:30 AM] Unknown User Nathan Rodriguez joined the meeting.
[9:30 AM] Unknown User Moser, Greg joined the meeting.

[9:30 AM] Unknown User Audrey Prince joined the meeting.

[9:30 AM] Unknown User Jill Fraser joined the meeting.

[9:31 AM] Unknown User Robbins Bill joined the meeting.

[9:31 AM] Unknown User Colin Insley (Guest) joined the meeting.

[9:31 AM] Unknown User Keith Hensel joined the meeting.

[9:31 AM] Unknown User Nancy Balter (Guest) joined the meeting.

[9:31 AM] Unknown User Jim Kirch - CO DWR (Guest) joined the meeting.

[9:31 AM] Unknown User Melissa Ryder (Arvada) (Guest) joined the meeting.

[9:31 AM] Unknown User Brady, Cynthia A joined the meeting.

[9:31 AM] Unknown User Mary Ann Bonnell joined the meeting.

[9:31 AM] Unknown User Tom Hoby joined the meeting.

[9:31 AM] Unknown User Anne Heine joined the meeting.

[9:31 AM] Unknown User Kit Lammers joined the meeting.

[9:32 AM] Unknown User Mari Johnson joined the meeting.

[9:32 AM] Unknown User Brooke Seymour joined the meeting.

[9:33 AM] Unknown User Vince Casteel joined the meeting.

[9:34 AM] Unknown User Caitlin Hasenbalg Long joined the meeting.

[9:34 AM] Erika Roberts (Guest)

Erika Roberts, Jefferson County Sheriffs Office - Emergency Management

[9:34 AM] Kurtis Behn

Kurt Behn, Assistant County Attorney, Jeffco

[9:34 AM] Steve Durian

Steve Durian, Jefferson County T&E

[9:34 AM] Franco, Rebecca J. (Guest)

Becky Franco, Manager of Emergency Management, Denver Water

[9:35 AM] Unknown User Chuck (Guest) joined the meeting.

[9:35 AM] Dorie Dalton

Dorie Dalton - Wildland Specialist - Genesee Fire Rescue

[9:35 AM] Grey La Certe - DHSEM (Guest)

Grey La Certe - DHSEM Regional Field Manager

[9:35 AM] Melissa Ryder (Arvada) (Guest)

Melissa Ryder, City of Arvada

[9:35 AM] Jim Kirch - CO DWR (Guest)

Jim Kirch - CO Dam Safety - Dam Safety Engineer

[9:35 AM] Brislawn, Jeff P

Jeff Brislawn, Hazard Mitigation Lead, Wood Environment & Infrastructure Solutions

[9:35 AM] Unknown User Scott (Guest) joined the meeting.

[9:35 AM] Kit Lammers

Kit Lammers, Community Resources Director, City of Edgewater

[9:35 AM] Andre Jaen

Andre Jaen, Jeffco Building Safety

[9:35 AM] Brooke Seymour (Guest)
Brooke Seymour, West Watershed Manager, Mile High Flood District

[9:35 AM] Nathan Rodriguez
Nathan Rodriguez, Jefferson County Public Health Emergency Preparedness and Response

[9:35 AM] Jim King (Guest)
James King, Fire Marshal, Evergreen Fire Rescue

[9:35 AM] Banks, Brian -FS (Guest)
Brian Banks, District Ranger. South Platte Ranger District, PSICC

[9:35 AM] Caitlin Hasenbalg Long
Caitlin Long, Senior Sustainability Planner, City of Lakewood

[9:35 AM] Alan Anderson
Alan Anderson - Fire Chief - Foothills Fire Protection District

[9:35 AM] Alan Fletcher
Alan Fletcher, Fairmount Fire Rescue, Fire Chief

[9:35 AM] Gerald Bader
Jerry Bader Jefferson County Open Space Natural Resource Lead

[9:35 AM] Vince Casteel
Vince Casteel, City of Lakewood Engineering

[9:35 AM] Brady, Cynthia A (Guest)
Cindy Brady Denver Water Raw Water Supply

[9:35 AM] Paul Amundson (Guest)
Paul Amundson Evergreen Fire/Rescue

[9:35 AM] Unknown User Michael Dobbs joined the meeting.

[9:35 AM] Curt Rogers (Guest)
Curt Rogers, North Fork Fire, Chief

[9:35 AM] Jim Watt
Jim Watt, Boulder Creek Watershed, MHPD

[9:35 AM] Bob Heine (Guest)
Bob Heine, Director, Lookout Mountain Water District

[9:35 AM] Jesse Miller
Jesse Miller, City of Lakewood Emergency Management

[9:35 AM] Mari Johnson

Mari Johnson - CSU Extension - Jefferson County, Natural Resource Agent/Interim Assistant Director

[9:35 AM] Unknown User Mark Danner joined the meeting.

[9:35 AM] Shelley E. Cobau
Shelley Cobau w/IMEG, representing the Town of Morrison

[9:36 AM] Robbins Bill
Bill Robbins - Jeffco Schools - Emergency Management

[9:36 AM] Moser, Greg
Greg Moser, City of Westminster Emergency Management Coordinator

[9:36 AM] Unknown User Damian DiFeo joined the meeting.

[9:36 AM] Colin Insley (Guest)
Colin Insley, Director of Parks, Planning and Construction for Foothills Park & Recreation District.

[9:37 AM] Andy Stewart (Arvada) (Guest)
Andy Stewart, City of Arvada, Floodplain Administrator

[9:37 AM] Joe Snyder
Joe Snyder, Fairmount Fire Rescue, Division Chief

[9:37 AM] Mary Ann Bonnell
Mary Ann Bonnell - Visitor Services Manager, Jeffco Open Space

[9:38 AM] Unknown User Bryan Kohlenberg joined the meeting.

[9:38 AM] Robert Ipatenco
Robert Ipatenco, Fairmount Fire Rescue, Fire Marshal

[9:59 AM] Brooke Seymour (Guest)
"Climate variability"?

[9:59 AM] Jim King (Guest)
Jefferson County has adopted appendix z (chapter 5 of the ICC WUI code) to address hardening of commercial and residential construction. Item E may be amended to pursue continued adoption of the WUI code.

[10:00 AM] Brislawn, Jeff P
"Future Changing Conditions" is a term FEMA uses

[10:01 AM] Banks, Brian -FS (Guest)
Weather and climate are different things, I think we should stick with Climate Change, dancing around the issue will cause confusion.
(2 liked)

[10:02 AM] Caitlin Hasenbalg Long
Agree with sticking with Climate Change. Many of the public comments also noted that climate change was not included as a hazard, it is clearly important to many in the JeffCo community.

(2 liked)

[10:03 AM] Unknown User Jessica Parivar (Guest) joined the meeting.

[10:03 AM] Alan Fletcher

Understand how climate can effect the severity and frequency of hazards.

(2 liked)

[10:04 AM] Mary Ann Bonnell

Agreed. Swapping weather for climate is inaccurate. Climate change is observable, attributing it to humans is often the sticking point. If we avoid attributing climate change to humans, we might be able to avoid some of the concern with the term.

(2 liked)

[10:05 AM] Erika Roberts (Guest)

Please sign-in under the chat if you have not already. Name & Agency

[10:06 AM] Jill Fraser

jill fraser, jeffco

[10:06 AM] Anne Heine

Anne Heine, City of Lakewood

[10:07 AM] Cory Marusin

Cory Marusin, Jefferson County Open Space - Operations Coordinator

[10:07 AM] Anjanette Hawkins

Anjanette Hawkins, JCPH

[10:07 AM] Joe Puhr

Joseph Puhr City of Golden

[10:10 AM] Caitlin Hasenbalg Long

Consider more about health, there's not much about the impacts actual people

[10:10 AM] Jill Fraser

agree!!

[10:13 AM] Nancy Balter (Guest)

for Goal 2a I would recommend that it be more specific for wildfire evacuation preplanning

Goal 3: there needs to more collaboration between departments/division within in the county

[10:22 AM] Mari Johnson

Adding cooperation and partnering on education and outreach efforts in addition to mitigation efforts would be helpful as well

[10:38 AM] Jill Fraser

Erika - Should we consider having a separate meeting with Health folks like Caitlin and InfoSec folks like me? Understandably, the history of this process is natural hazards focused and what we've reviewed today isn't

connecting for me. I don't want to hijack this conversation with all my thoughts on cyber since it is something new for us.

[10:40 AM] Brooke Seymour (Guest)

MHFD has a floodplain preservation fund to assist local governments with acquiring flood prone properties. It would be helpful if there was a plan in place to help identify and prioritize properties in Jefferson County for potential acquisition using this fund.

[10:44 AM] Erika Roberts (Guest)

Jill Fraser We absolutely can. I will schedule some time with you, other appropriate InfoSec folks and our vendor. We have met briefly with JCPH to discuss the "public health" section as it will include more than pandemic, but some overarching "human health" concerns

[10:44 AM] Unknown User Scott (Guest) left the conversation.

[10:45 AM] Johnson, Christopher A

Shared a file

[Selection and Prioritization Criteria Handout.pdf]

([https://woodplc-my.sharepoint.com/personal/christopher_johnson3_woodplc_com/Documents/Microsoft Teams Chat Files/Selection and Prioritization Criteria Handout.pdf](https://woodplc-my.sharepoint.com/personal/christopher_johnson3_woodplc_com/Documents/Microsoft%20Teams%20Chat%20Files/Selection%20and%20Prioritization%20Criteria%20Handout.pdf))

[10:45 AM] Unknown User Mark Forgy - IHFR (Guest) joined the meeting.

[10:47 AM] Joe Snyder

I might have missed it, but will you be providing us with a copy of this meeting presentation?

[10:48 AM] Erika Roberts (Guest)

Joe Snyder absolutely. And as with the other meetings, this meeting is also being recorded for your reference (1 liked)

[10:49 AM] Unknown User Colin Insley (Guest) left the conversation.

[10:50 AM] Stephens, Garrett - NRCS, Denver, CO (Guest)

forgot to add my name to roster: Garrett Stephens, Jefferson Conservation District

[10:53 AM] Carr, Amy

New Mitigation Action Form: <http://bit.ly/JeffCoActions>

Fill | Jefferson County Hazard Mitigation Plan New Mitigation Action Worksheet
bit.ly

[10:53 AM] Kit Lammers

If we did update the spreadsheet do you want us to fill out the form too?

[10:55 AM] Johnson, Christopher A

Shared a file

[Typical Mitigation Action Alternatives.pdf]

([https://woodplc-my.sharepoint.com/personal/christopher_johnson3_woodplc_com/Documents/Microsoft Teams Chat Files/Typical Mitigation Action Alternatives.pdf](https://woodplc-my.sharepoint.com/personal/christopher_johnson3_woodplc_com/Documents/Microsoft%20Teams%20Chat%20Files/Typical%20Mitigation%20Action%20Alternatives.pdf))

[10:55 AM] Michael Dobbs
Michael Dobbs, Jeffco Safety and Compliance

[10:57 AM] Carr, Amy
FEMA Mitigation Action Portfolio: https://www.fema.gov/sites/default/files/2020-08/fema_mitigation-action-portfolio-support-document_08-01-2020_0.pdf

[10:59 AM] Carr, Amy
Planning for Hazards: <https://www.planningforhazards.com/home>

[11:04 AM] Erika Roberts (Guest)
Reminder to track your time for this projects in-kind match!!!
<https://forms.monday.com/forms/186954aa88b849171e6fb5ef902c0679?r=use1>

[11:07 AM] Banks, Brian -FS (Guest)
Prescribed fire? Did I miss that?

[11:15 AM] Unknown User John Putt, Evergreen left the conversation.

[11:18 AM] Unknown User Nancy Balter (Guest) left the conversation.

[11:20 AM] Unknown User Jim King (Guest) left the conversation.

[11:20 AM] Unknown User Erika Roberts (Guest) left the conversation.

[11:20 AM] Unknown User Kris Wahlers - Chatfield SP (Guest) left the conversation.

[11:20 AM] Unknown User Grey La Certe - DHSEM (Guest) left the conversation.

[11:21 AM] Unknown User Paul Amundson left the conversation.

[11:21 AM] Unknown User Bob Heine (Guest) left the conversation.

[11:21 AM] Unknown User Melissa Ryder (Arvada) (Guest) left the conversation.

[11:21 AM] Unknown User John Putt (Guest) left the conversation.

[11:21 AM] Unknown User Andy Stewart (Arvada) (Guest) left the conversation.

[11:21 AM] Unknown User Mark Forgy - IHFR (Guest) left the conversation.

[11:21 AM] Unknown User Curt Rogers left the conversation.

Mitigation Action Selection and Prioritization Criteria

Does the proposed action protect lives or vulnerable populations?

Does the proposed action address hazards or areas with the highest risk?

Does the proposed action protect critical facilities, infrastructure, or community assets?

Does the proposed action meet multiple objectives (multi-objective management)?

STAPLE/E

Developed by FEMA, this method of applying evaluation criteria enables the planning team to consider in a systematic way the social, technical, administrative, political, legal, economic, and environmental opportunities and constraints of implementing a particular mitigation action. For each action, the HMPC should ask, and consider the answers to, the following questions:

Social

Does the measure treat people fairly (different groups, different generations)? Does it consider social equity, disadvantaged communities, or vulnerable populations?

Technical

Will it work? (Does it solve the problem? Is it feasible?)

Aministrative

Is there capacity to implement and manage project?

Political

Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?

Legal

Does your organization have the authority to implement? Is it legal? Are there liability implications?

Economic

Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?

Environmental

Does it comply with environmental regulations or have adverse environmental impacts?

Example Mitigation Action Items

Alternative Mitigation Actions	Dam Failure	Floods	Hazardous Materials	Drought	Weather Extremes (hail, lightning, temps,)	Wind/Tornado	Wildland Fires	Severe Winter Storm
PREVENTION								
Building codes and enforcement		■	■	■	■	■	■	■
Comprehensive Watershed Tax		■						
Density controls	■	■	■				■	
Design review standards		■	■	■		■	■	
Easements		■	■				■	
Environmental review standards		■	■				■	
Floodplain development regulations	■	■	■					
Hazard mapping	■	■	■				■	
Floodplain zoning	■	■	■					
Forest fire fuel reduction			■				■	
Housing/landlord codes			■	■	■			
Slide-prone area/grading/hillside development regulations							■	
Manufactured home guidelines/regulations		■			■	■		
Minimize hazardous materials waste generation			■					
Multi-Jurisdiction Cooperation within watershed	■	■		■				
Open space preservation	■	■					■	
Performance standards	■	■		■	■	■	■	■
Periodically contain/remove wastes for disposal			■					
Pesticide/herbicide management regulations			■					
Special use permits	■	■	■				■	
Stormwater management regulations		■	■					
Subdivision and development regulations	■	■	■	■		■	■	
Surge protectors and lightning protection					■			
Tree Management				■	■	■	■	■
Transfer of development rights		■					■	
Utility location			■		■	■		■

PROPERTY PROTECTION								
Acquisition of hazard prone structures	■	■					■	
Facility inspections/reporting	■	■	■					
Construction of barriers around structures	■	■	■					
Elevation of structures	■	■						
Relocation out of hazard areas	■	■	■				■	
Structural retrofits (e.g., reinforcement, floodproofing, bracing, etc.)		■	■	■	■	■	■	■
PUBLIC EDUCATION AND AWARENESS						■		
Debris Control		■				■		
Flood Insurance	■	■						
Hazard information centers	■	■	■	■	■	■	■	■
Public education and outreach programs	■	■	■	■	■	■	■	■
Real estate disclosure	■	■	■		■		■	■
Crop Insurance				■	■			
Lightning detectors in public areas					■			
NATURAL RESOURCE PROTECTION								
Best Management Practices (BMPs)		■	■	■	■		■	
Forest and vegetation management	■	■		■	■		■	■
Hydrological Monitoring	■	■	■	■	■			
Sediment and erosion control regulations	■	■	■	■				
Stream corridor restoration		■						
Stream dumping regulations		■	■					
Urban forestry and landscape management		■		■	■		■	■
Wetlands development regulations		■	■				■	
EMERGENCY SERVICES								
Critical facilities protection	■	■	■	■	■	■	■	■
Emergency response services	■	■	■		■	■	■	■
Facility employee safety training programs	■	■	■		■	■	■	■
Hazard threat recognition	■	■	■	■	■	■	■	■
Hazard warning systems (community sirens, NOAA weather radio)	■	■	■		■	■	■	■
Health and safety maintenance	■	■	■	■	■	■	■	■
Post-disaster mitigation	■	■	■	■	■	■	■	■
Evacuation planning	■	■	■				■	

STRUCTURAL PROJECTS								
Channel maintenance		■						
Dams/reservoirs (including maintenance)	■	■						
Isolate hazardous materials waste storage sties			■					
Levees and floodwalls (including maintenance)		■						
Safe room/shelter					■	■		■
Secondary containment system			■					
Site reclamation/restoration/revegetation		■	■	■				
Snow fences								■
Water supply augmentation				■	■			

Jefferson County Hazard Mitigation Plan Update 2021 - Goals & Objectives Update

Goal 1: Increase awareness about natural hazards.	Goal 2: Reduce impacts of natural hazards on life, property, and the environment.	Goal 3: Strengthen and develop partnerships in regards to mitigating hazard impacts.	Your Jurisdiction and/or Agency
Still appropriate	Still appropriate	Still appropriate	Fairmount Fire Rescue
no changes	New objective: something geared toward incentivizing and supporting industry needed to utilize forest biomass (which is a major bottleneck to getting more mitigation done).	no changes	Jefferson Conservation District
- remove "natural" or add "and man-made hazards" - another objective may be to create common terminology among agencies concerning notification of hazards and actions to take.	- remove "natural" or add "and man-made hazards"	- create a HMP standing committee of Jefferson County agencies to provide mitigation fund governance and to act as a the clearinghouse for all outside activities. Sub committees may be developed to allow focused conversation and strategies by projects, topics or hazard. It will also allow existing activities to be streamlined to minimize duplication of efforts and faster access to new updates, project status and potential funding.	Jefferson County / Emergency Management, JCISO
1.3 what is the emergency notification system the county will use? If Code Red is not our platform, what is?			Golden Fire Department
Wildfire is the single greatest threat to loss of life in the WUI of Jefferson County. I would like to see a more detailed objective list specifically about Wildfire education and training for the dispatchers and all emergency responders. As well as, education and training for the community specifically mitigation, early emergency warning and evacuation.	Evergreen Fire Rescue has a proactive wildfire education and mitigation approach with their Community Wildfire Protection Improvement Plan Units (CWPIP). The Evergreen Fire District is broken down into 26 geographic units. This system keeps outreach and mitigation efforts manageable. Additionally, the Wildfire Prepared Home Assessment Program is coming online for evergreen and Elk Creek Fire this year. Safe refuge areas for wildfire evacuation need to be established. Too many of the evacuation routes as they exist are noted in the Evergreen and Elk Creek CWPP to be non-survivable.	Evergreen Fire Rescue and Elk Creek Fire Rescue are partnering with the Rotary Wildfire Ready project to enhance community education (see rotarywildfireready.com). The greatest challenge to a successful mitigation program is to involve the private landowners to do the necessary mitigation work.	Community Member
Consider adding "Evacuation Route" signs throughout the county. These are located around coastal areas to show evacuation routes for hurricanes. Would the county consider this for wildfire threats?	How is the county contributing to Objective 2.7? CWPP's are currently being created and/or updated by local districts. Objective 2.5 - Incentives for public to mitigate hazards on their own property would be huge in regard to wildfire mitigation. I feel that this should be explored further.	All are still very relevant.	Foothills Fire Protection District
I like the State of Colorado goal that says: Expand public awareness, education, and information programs relating to hazards and mitigation methods and techniques. I can see a nod to "resilience" in this objective as well. Something like, expand community preparedness education and resilience programs relating to hazards and mitigation methods and techniques. Maybe this could be incorporated into objective 1.1. Should we add the objective to keep communities and the county involved in the Storm Ready program? We can also add an objective to facilitate communication and education about alert and warning (signing up for CodeRed).	All these objectives make sense and I think we should bring them forward to the new plan.	Objective 3.4 could have the additional link to water use and planning.	Arvada
No changes.	No changes.	No changes.	City of Wheat Ridge
Objective 1.6/1.5 increase the public awareness for the funding and the accountability of taking action on there own property.	2.6/2.7 are the most valuable ones	3.1/3.2	Evergreen Fire

Events

Search Events

Categories

- Art
- Causes
- Comedy
- Crafts
- Dance
- Drinks
- Film
- Fitness
- Food
- Games
- Gardening
- Health
- Home
- Literature
- Music
- Networking
- Party
- Religion
- Shopping



TUESDAY, JUNE 8, 2021 AT 5:30 PM MDT – 7 PM MDT

Help JeffCo Mitigate Hazards and Prepare for Disasters...

Online Event

Join Event

- More ▾
- ☆ Interested
- 🕒 Going
- ✉ Invite
- ➦
- ⋮

Details

- 🕒 1 hr 30 min
- 🚩 Event by Jefferson County Sheriff's Office
- 🌐 Online: bit.ly
- 🕒 Tuesday, June 8, 2021 at 5:30 PM MDT – 7 PM MDT
- 💰 Price: Free
- 🌐 Public · Anyone on or off Facebook

Jefferson County is in the process of updating its Multi-Hazard Mitigation Plan in 2020-2021 per the five-year update cycle required by FEMA and the Federal Disaster Mitigation Ac... [See More](#)

- Home
- Online

Host

 **Jefferson County Sheriff's Office** ✓
 Police Station · Government Organization · Law Enforcement Agency

Event Transparency





North Fork Fire Rescue

14h · 🌐



Jefferson County Sheriff's Office

4d · 🌐

Help JeffCo mitigate hazards and prepare for disasters and emergencies!

Join us for our 2nd virtual public meeting on June 8th at 5:30pm.

The purpose of thi... [See More](#)



1



City of Wheat Ridge Government

23h · 🌐



Help JeffCo mitigate hazards and prepare for disasters and emergencies!

Join the 2nd virtual public meeting on June 8th at 5:30pm

For more info and for access to the public meeting, please visit: ... [See More](#)



Jefferson County Sheriff's Office

4d · 🌐

Help JeffCo mitigate hazards and prepare for disasters and emergencies!

Join us for our 2nd virtual public meeting on June 8th at 5:30pm.

The purpose of thi... [See More](#)

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Fairmount Fire Protection District

3d · 🌐



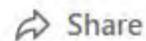
Jefferson County Sheriff's Office ✓

4d · 🌐

Help JeffCo mitigate hazards and prepare for disasters and emergencies!

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The purpose of thi... [See More](#)





Lakewood Colorado City Government

3d · 🌐



Jefferson County Sheriff's Office ✓

4d · 🌐

Help JeffCo mitigate hazards and prepare for disasters and emergencies!

Join us for our 2nd virtual public meeting on June 8th at 5:30pm.

The purpose of thi... See More

👍 Like

💬 Comment

➦ Share



Golden Fire-Rescue

4d · 🌐



TODAY AT 5:30 PM MDT

Help JeffCo Mitigate Hazards and Prepare for Disasters and Emergencies!

👍 Going ▾

You like Jefferson County Sheriff's Office

👍 1

👍 Like

💬 Comment

➦ Share



Write a comment...





Greg Moser

22h · 🌐



Jefferson County Sheriff's Office ✓

4d · 🌐

Help JeffCo mitigate hazards and prepare for disasters and emergencies!

Join us for our 2nd virtual public meeting on June 8th at 5:30pm.

The purpose of thi... [See More](#)

👍 Like

💬 Comment

➦ Share



Write a comment...



Hazard Mitigation Plan Update



As an Arvada resident, you may be familiar with the natural hazards we face as a community. Flood, winter storm, wildfire, and more events are part of life in the Front Range of Colorado. By identifying our risk, assessing our vulnerability, and strategizing actions for addressing these natural hazards, the community is more resilient to them. Hazard mitigation is defined by the Federal Emergency Management Agency as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event."

A major part of our resilience as a City is our participation in the Jefferson County Hazard Mitigation Plan. This plan is a multi-jurisdictional effort to reduce the impacts of disaster events on citizens and property in our community. In 2021, a multi-departmental team is collaborating with other municipalities, special districts, and the county on the update process.

In the beginning phases of the plan update, we need your input to help us better understand our vulnerabilities, your experiences, and opportunities to reduce the impacts of hazards before they occur. Share your perspective through the public input survey by January 31, 2021.

There are two opportunities to join public meetings with the planning team. The **first virtual public meeting Thursday, January 14th at 5:30pm**. The purpose of the meeting is a discussion on local hazards identification and risk assessments with the public. **You can register here:** <http://bit.ly/JCSQHMP>.

In later phases, the planning team will share the full draft of the Hazard Mitigation Plan and seek ideas for action. That phase will include the second planning meeting which will take place in March or April and the details will be provided soon.

Throughout the process, we'd like to hear from Arvada residents to better understand your experiences and opportunities to reduce the impacts of hazards before they occur.

[Fill out the "Jefferson County Hazard Mitigation Plan Update Public Input Survey" here!](#)

PLAN FEEDBACK

Public Comments

We are committed to working in partnership with you, our community members, as we identify risks and prioritize the mitigation goals for the next five years. What do you want the planning team to know?

Translate

Select Language

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Key Dates

1st Public Workshop
January 14 2021

Public Survey Closes
January 31 2021

2nd Public Workshop
April 2021

Draft Plan Available for Public Review
April 2021

Agency Review Complete
July 2021

[more...](#)

Important Links

[Arvada Hazard Mitigation](#)

Who's Listening



City of Arvada Government

January 8 at 9:05 AM · 🌐

Help Arvada prepare for and protect our community from natural hazards. Provide your input as we update the Jefferson County Hazard Mitigation Plan through this short survey below.



Jefferson County Sheriff's Office

January 7 at 1:27 PM

Help the JCSO Emergency Management team prepare for disasters and emergencies! Please take our short 8 question HMP Survey at <http://bit.ly/JeffCOHMP> today!

Jefferson County is updating our Multi-Jurisdictional Hazard Mitigation Plan (HMP) to help us

- Prepare for natural disasters
- Prepare for human-caused hazards
- Identify ways to reduce losses
- Protect our community from hazardous events

We need your input to help us better understand our vulnerabilities, your experiences, and opportunities to reduce the impacts of hazards before they occur.

👍👎 7

👍 Like

💬 Comment

➦ Share



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City of Arvada
@cityofarvada

Jefferson County is in the process of updating its Multi-Hazard Mitigation Plan, and Arvada is a participating jurisdiction. Join Jeffco's next virtual public meeting at 5:30 on Tuesday, June 8. You can also join by phone. Learn more at bit.ly/3lRnS6T.



12:00 PM · Jun 6, 2021 · CoSchedule

2 Likes



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City of Arvada
@cityofarvada

Follow

Arvada, CO is an attractive western suburb with a population of more than 120,000. Arvada maintains a cherished hometown feel and a diverse business community.

What's happening

World news - LIVE

Vice President Kamala Harris visits Guatemala and Mexico

Trending with [Kamala Harris](#), [Lester Holt](#)



Entertainment - Trending

Trisha

Trending with [Frenemies](#)

Sports - Trending

Aaron Rodgers

Trending with [#Packers](#)

ET Canada · 2 hours ago

Teyana Taylor is the first Black woman to be named Maxim's "Sexiest Women Alive"





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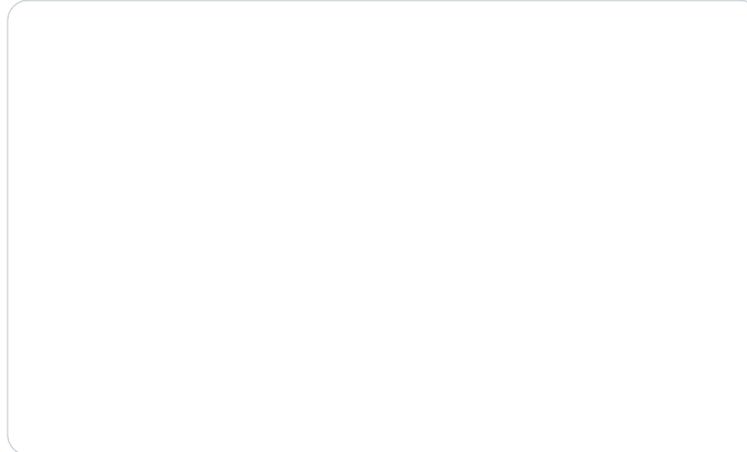
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City of Arvada @cityofarvada

Help Arvada prepare for and protect our community from natural hazards. Provide your input as we partner with other jurisdictions in helping Jefferson County update their Hazard Mitigation Plan. Learn more at bit.ly/2XRhX8n.



9:00 AM · Jan 28, 2021 · CoSchedule



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Relevant people



City of Arvada @cityofarvada

Arvada, CO is an att suburb with a popu 120,000. Arvada ma hometown feel and community.

What's happening

Business & finance · 41 minutes i

Robinhood users file a clas action lawsuit against the company after it restricted transactions for various sec

Trending with #GameStop, #Robi

Trending in United States

Elon

109K Tweets

Food · Trending

Subway

57.6K Tweets

COVID-19 · LIVE

COVID-19: News and updat Texas

NFL · 4 hours ago

Deshaun Watson has asked traded from the Texans — next?

Trending with Texans, Deshaun W

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Don't miss what's happening

People on Twitter are the first to know.

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City of Arvada Retweeted



Jeffco Sheriff  @jeffcosherriffco · Jan 7

...

Hey #Jeffco! Help the JCSO Emergency Management team prepare for disasters and emergencies! We need your input to better understand our vulnerabilities & ways to reduce the impacts of hazards. Take a short 8 question Hazard Mitigation Plan Survey at bit.ly/JeffCOHMP today!



 10

 20



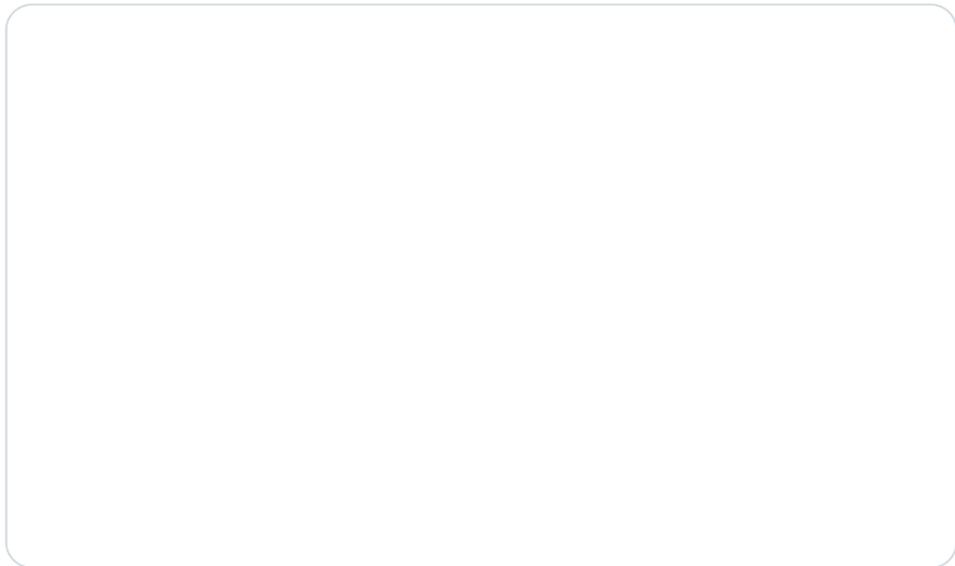


City of Arvada

@cityofarvada



Help Arvada prepare for and protect our community from natural hazards. Provide your input as we partner with other jurisdictions in helping Jefferson County update their Hazard Mitigation Plan. Learn more at bit.ly/2XRhX8n.



9:00 AM · Jan 28, 2021 · CoSchedule



2021 Plan Update

The Federal Emergency Management Agency mandates communities update their Hazard Mitigation Plan every 5 years. As a jurisdiction within Jefferson County, a multi-departmental team from the City of Arvada is involved in the 2021 update process.

To begin the update process, Jefferson County and its communities will identify hazards that threaten our residents and determine the likely impacts of those hazards. After assessing and identifying risks, the City will set mitigation goals for the next 5 years. This planning process culminates in an annex specific to Arvada.

The City of Arvada Annex provides a more detailed assessment of our unique risks as well as our specific mitigation strategy. It contains:

- A community profile summarizing geography and climate, history, economy, and population;
- Hazard information detailing previous occurrences and probability of future occurrences;
- Vulnerability information in terms of future growth and development in hazard areas;
- A capability assessment describing existing regulations, planning documents, or personnel in the organization with a role in mitigation;
- Outreach efforts and partnerships and past mitigation projects.

2021 Key Dates

- January 14: First public workshop (register)
- January 31: Public survey closes
- April (TBD): Second public workshop
- April: Full draft available for public review
- July: Seek approval from the Colorado Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency
- August: Seek adoption by Arvada City Council

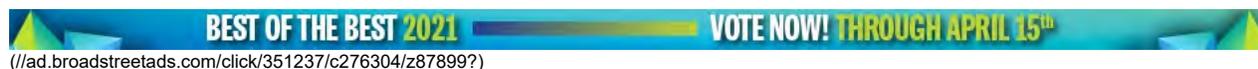
Provide Your Input

We want to hear from Arvada residents to better understand your experiences and ideas to reduce the impacts of hazards before they occur. Join us at Speak Up Arvada to view opportunities for public input and read project updates.



A publication of  Colorado Community Media
(/)

ARVADA PRESS



(//ad.broadstreetads.com/click/351237/c276304/z87899?)

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Working Together to Reduce Wildfire Risk in Jefferson County

Posted Tuesday, March 16, 2021 5:01 pm

Jefferson County Commissioners

Colorado watched last year the devastating impact of catastrophic fires. Homes were destroyed, families displaced and more than 625,000 acres of land scorched. Firefighters and law enforcement put their lives on the line to save others. In 2020, state officials recorded the three largest fires in Colorado's history. As our climate changes, scientists forecast that fast-moving wildfires will burn hotter and longer in increasingly dry conditions further fueled by dead forest vegetation like beetle-kill trees.

Jefferson County is not immune to wildfires. Almost 25 years later, you can still see the burn scars from the Buffalo Creek fire. The heat was so intense that it scorched the ground, creating what's known as hydrophobic soil. Destructive flooding followed that caused two deaths and extensive property damage. The fire has a lingering impact on the landscape to this day.

More recently, the Elephant Butte Fire threatened hundreds of homes and families in Evergreen. Thanks to the swift work of first responders and some help from Mother Nature, no one was injured and no structures were lost, saving an estimated \$48 million in potential property damage.

These fires occurred in what's called the wildland-urban interface – or WUI – where development is near or on forested lands. More than two-thirds of the county is in the WUI, including Evergreen and Conifer which rank #1 in Colorado, and in the top 10 nationally, in the potential risk of property loss to wildfire. That's according to the Verisk Fireline State Risk Report.

The impact of wildfire is not limited to our Foothills communities either. Wildfire can negatively affect air and water quality in communities across our county.

Reducing wildfire risk is a top priority for the county as we work closely with fire chiefs, the Jeffco Sheriff's Office, Jeffco Open Space, Jeffco Planning and Zoning, forest health managers, water experts, community leaders and others to help address this pressing issue, including:

- Creating the county's first ever Wildfire Risk Reduction Task Force, which is made up of 31 members representing stakeholders across Jeffco. Late last year, task force members presented several recommendations to county commissioners focused on forest mitigation, community education and funding. See the task force's recommendations at: <https://bit.ly/3tHRwL>.
- Enhancing the county's building and residential codes to harden new and existing homes against wildfire risk. This work was done at the urging – and in partnership – with Foothills fire chiefs who worked with Jeffco Building Safety leaders to create new codes later approved by county commissioners.
- Improving forest health on 1,000 acres of Jeffco Open Space over the next five years by significantly thinning dense tree stands. This seven-fold increase in activity will reduce wildfire fuels and risk in mountain areas.

Other county initiatives include the Jeffco slash program to help community members remove forest debris near their homes such as dead tree branches, pinecones and needles. Jeffco's Emergency Management Team is working with partners to update the county's Multi-Hazard Mitigation Plan. More at <https://bit.ly/3uDUORf>. Commissioners also approved last year an amendment to the county's policy to allow for signs in the right-of-way that raise awareness of fire danger and county staff worked on a memorandum of understanding to partner with Evergreen Fire Rescue for mitigation of fire risks within county right-of-way.

Still, more work remains as we address growth and development in high fire risk areas. Jeffco's Planning and Zoning team is tackling two of the task force's recommendations: defining the wildland-urban interface and strengthening county regulations and enforcement on defensible space around homes and other structures in the WUI.

Other changes under consideration include requiring an evacuation impact report for certain rezoning applications in the Wildfire Hazard Overlay District, requiring proof of fire protection to obtain building permit, and a myriad of proposals suggested by fire protection districts, Mountain Area Concerned Citizens and engaged community members.

We are not only focusing on wildfire at a county level, but partnering with our state and national leaders. Commissioners and several members of the county's wildfire task force recently attended Congressman Joe Neguse's first Wildfire Summit to address policy solutions focused on forest health, disaster recovery, watershed protection and support services for firefighters.

Commissioner Dahlkemper also serves as one of two county commissioners representing the interests of counties statewide on the Colorado Fire Commission, a group created by the Governor to address wildfire issues.

Together, we're seeking collaborative solutions as we learn from 2020 and move forward in 2021 to keep Jeffco safe from wildfire and protect our public lands for generations to come.

Tracy Kraft-Tharp, Andy Kerr and Lesley Dahlkemper comprise the Board of County Commissioners for Jefferson County. They can be reached at commish@jeffco.us or individually at tktharp@jeffco.us, akerr@jeffco.us and ldahkem@jeffco.us.

Keywords



Staff Profile: Rachel Juritsch

Rachel recently joined the Jeffco CSU Extension team as the new **4-H Assistant and General Programs Assistant**. She grew up in Schuylkill Haven, Pennsylvania, where she spent her time exploring the outdoors and growing a deep appreciation for the environment. This led to her pursuing a bachelor's degree in Sustainable Energy Management from the SUNY College of Environmental Science and Forestry. After college, Rachel took an AmeriCorps VISTA position for two years at an environmental social justice nonprofit in rural Minnesota. In her free time she enjoys hiking, fishing, kayaking, and crocheting, and hopes to learn how to ski. She is excited to learn all aspects of the 4-H program from her coworkers and community members.



Jefferson County Hazard Mitigation Plan – We need your input!

Please take our short 8 question Multi-Jurisdictional Hazard Mitigation Plan (HMP) Survey at

<https://bit.ly/JeffCOHMPtoday>

Jefferson County is updating our HMP to help us

- Prepare for natural disasters
- Prepare for human-caused hazards
- Identify ways to reduce losses
- Protect our community from hazardous events

We need your input to help us better understand our vulnerabilities, your experiences, and opportunities to reduce the impacts of hazards before they occur. Survey is open until January 31st.

Take the 8 Question Survey Here

Join the Public Meeting on Thursday, January 14th at 5:30 pm

The purpose of the meeting is a discussion on local hazards identification and risk assessments with the public

Please use the Microsoft Teams meeting link below.

You can connect directly from your browser. If you choose to download the app, please plan before the start of the meeting.

Join on your computer or mobile app

[Click here to join the meeting](#)

Or call in (audio only)

+1 281-810-1627..482806019# United States, Houston

(866) 670-1764..482806019# United States (Toll-free)

Phone Conference ID: 482 806 019#

Help the JCSO Emergency Management team prepare for disasters and emergencies!

Jefferson County is updating our Multi-Jurisdictional
Hazard Mitigation Plan to help us

- Prepare for natural disasters
- Prepare for human-caused hazards
- Identify ways to reduce losses
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experiences, and opportunities to
reduce the impacts of hazards before they occur.

**Please take our short 8 question HMP Survey at <http://bit.ly/JeffcoHMP>
today!**



Fairmount Fire Protection District

Jan 12 · 🌐



Help the JCSO Emergency Management team prepare for disasters and emergencies!

Join us for our first virtual public meeting this Thursday, January 14th at 5:30pm. The purpose of the meeting is a discussion on local hazards identification and risk assessments with the public.

For more info & to register, visit <http://bit.ly/JCSOHMP>

And, if you haven't already, be sure to take our short Hazard Mitigation Plan survey. We want to hear from you! The survey is also located on the page linked above!



JOIN US FOR OUR FIRST PUBLIC MEETING THURSDAY, JAN 14TH @ 5:30PM



2

From: [Erika Roberts](#)
To: [Field, Scott](#)
Cc: [Pat OConnell](#)
Subject: FW: --{EXTERNAL}-- Engage Jeffco June Issue
Date: Thursday, June 17, 2021 8:22:53 AM

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

This went out to 10,000+ people. Is this good documentation for the plan?

From: Jefferson County <jeffcopublicaffairs@jeffco.us>
Sent: Thursday, June 17, 2021 8:02 AM
To: Erika Roberts <elroberts@co.jefferson.co.us>
Subject: --{EXTERNAL}-- Engage Jeffco June Issue

CAUTION: This email originated from outside Jefferson County Government. Do not click links or open attachments unless you recognize the sender and know the content is safe.



[View as Webpage](#)

[Survey](#) and the [Community Needs Assessment Survey](#). Your feedback will help us make important plans for the future of Jefferson County Public Health programs and COVID-19 relief efforts. Please share your thoughts by July 12. Thank you for helping our community move forward!



Provide Your Feedback on the Jeffco Hazard Mitigation Plan Update

Help mitigate hazards and prepare for disasters and emergencies. The Jefferson County Multi-Jurisdictional [Hazard Mitigation Plan](#) is updated every five years to keep it current and include new information on hazards, vulnerabilities, assets at risk, and ways to reduce impacts through long-term, hazard mitigation projects. The plan is open for review and comment from June 7-25. The virtual public meeting forum and [comment form can be found here](#).



Support Sustainability in Your Community

The Jefferson County Sustainability Commission recently released its [2020 Annual Report](#). In addition to this report, there are a number of [sustainability resources available](#) on the Sustainability Commission website:

- Resources to cut your energy/carbon footprint
- Read about our Sustainability award winners
- Learn about the Sustainability Foundation
- Find out about the Climate Action Plan



Attend a Public Meeting for the South Table Mountain Park Plan

Jefferson County Open Space (JCOS) is currently updating the access and trailheads component of the South Table Mountain Park Plan to help address visitation pressure. This plan proposes a new main trailhead at Denver West and improvements to access points on Golden Hills Road and Rimrock Drive. JCOS and the City of Golden will co-host a virtual community meeting on June 22 at 6 p.m. to discuss design alternatives for the access points at the Rimrock Drive and Golden Hills Road locations. Get more information on the [South Table Mountain Park page](#).





Golden Fire

836 Tweets



Edit profile

Golden Fire

@GoldenCOFire

Golden, Colorado cityofgolden.net/links/fire Joined October 2013

179 Following 2,871 Followers

Tweets

Tweets & replies

Media

Likes



Golden Fire @GoldenCOFire · Jan 12



Help your first responders plan for potential disasters and emergencies nextdoor.com/city/post/1735... via @Nextdoor





✓ **Golden Fire Department**

Media Services Capt. Tom Young • 12 Jan



Help your first responders plan for potential disasters and emergencies.
Help the JCSO Emergency Management team prepare for disasters and emergencies!

Join us for our first virtual public meeting this Thursday, January 14th at 5:30pm. The purpose of the meeting is a discussion on local hazards identification and risk assessments with the public.

For more info & to register, visit the link below.



Hazard Mitigation Plan | Jefferson County, CO

jeffco.us

Posted to **Subscribers of Golden Fire Department**



Like



Comment



1

· 485 Impressions



Golden Fire-Rescue

Published by Jake Raw · January 12 at 1:47 PM · 🌐



JOIN US FOR OUR FIRST PUBLIC MEETING THURSDAY, JAN 14TH @ 5:30PM

Jefferson County Sheriff's Office ✓

January 11 at 3:48 PM · 🌐

Help the JCSO Emergency Management team prepare for disasters and emergencies!

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For more info & to register, visit <http://bit.ly/JCSOHMP> ✓ ***

And, if you haven't already, be sure to take our short Hazard Mitigation Plan survey. We want to hear from you! The survey is also located on the page linked above! 😊

294
People Reached

3
Engagements

Boost Unavailable



Golden Fire-Rescue

Published by Jake Raw · January 11 at 2:50 PM · 🌐



Please take a moment and fill out this short survey to help us and the Jefferson County Sheriff's prepare for potential disasters and emergencies.



Jefferson County Sheriff's Office ✓

January 7 at 2:27 PM · 🌐

Help the JCSO Emergency Management team prepare for disasters and emergencies!

Please take our short 8 question HMP Survey at

<http://bit.ly/JeffCOHMP> ✓ today!

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We need your input to help us better understand our vulnerabilities, your experiences, and opportunities to reduce the impacts of hazards before they occur.

225
People Reached

13
Engagements

Boost Unavailable

From: [Stacie Oulton](#)
To: [All Employees](#)
Subject: Jan. 22, 2021 Friday Report -- Watch D'Evelyn Jr./Sr. High School's Marching Band represent Colorado in this week's Inauguration Parade Across America.
Date: Friday, January 22, 2021 2:42:29 PM

[View this email in your browser](#)

City of Lakewood weekly newsletter for Jan. 22, 2021

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In This Issue

- [City Council Update](#)
- [News & Events](#)
- [In the Community](#)

January meetings with residents

Ward 3 meeting
Visit with City Council members Mike Bieda and Anita Springsteen virtually in an informal setting, share ideas and learn more about your community from 9 to 10:30 a.m. Jan. 23. This meeting will be in a town hall style with Q&A and public comment. Details online: Lakewood.org/WardMeetings.

[Subscribe to Ward 3 Meeting Reminders](#).

City Council Update

Monday, Jan. 25: 7 p.m., Regular City Council Meeting.

Pending agenda items for Jan. 25 Regular City Council Meeting:

Council will appoint members to the city's boards and commissions. Council will also consider establishing the allocations for residential units for 2021 and assigning the allocations to pools under the city's Residential Growth Limitations Ordinance. Council will have a public hearing to consider the Solterra Centre Official Development Modification Plan No. 1. It will also consider extending the city's emergency declaration to Feb. 8. (Agenda items reflect the latest available information and are subject to change.)

Watch the virtual meeting:

- Lakewood.org/CouncilVideos
- LakewoodSpeaks.org
- Lakewood.org/Live8
- Cable channels 8 and 880

Provide public comment:

- Written comments can be provided on LakewoodSpeaks.org or at 303-987-7000 until noon on Jan. 25.
- Spoken comments can be provided during the meeting. The agenda with the phone number and instructions for calling to make public comment during the meeting will also be published online before the meeting. Another option is to watch for the call-in number for public comment to be displayed on the screen during the meeting.

[View agenda](#)



well as the public health orders for mass gatherings, Lakewood is exploring ideas for the third annual Big Boom Bash event, celebrating our nation's independence. We need your help identifying locations along with Jeffco Stadium where you have enjoyed watching the show in previous years. [Please take a brief online survey](#) to help us improve the celebration in the future.

Colfax Marathon

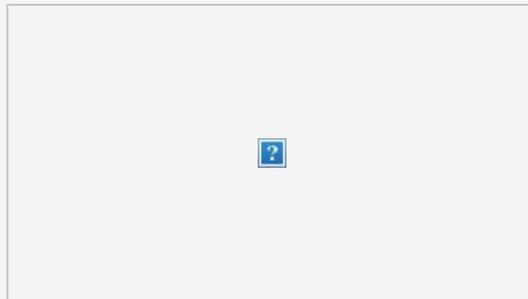
The running community will be able to get together this year for the 15th anniversary of the Colfax Marathon on Oct. 16-17. More details on the weekend schedule will be coming at [RunColfax.org](#).

Virtual operations continue for Municipal Court

Municipal Court will continue virtual operations through March 12, with plans to reopen at 8 a.m. on March 15. Jury trials will remain paused until March 15. To schedule a video or telephone appearance, please contact the court at 303-987-7400, then prompt 0 or courts@lakewoodco.org.

Take the hazard mitigation survey

Lakewood residents can take part in a countywide survey designed to analyze vulnerabilities to natural and humanmade hazards as well as the best mitigation strategies. The [online survey](#) is open through Jan. 31. The survey is part of the county's work to update the Multijurisdictional Hazard Mitigation Plan.



Summer camps registration

Summer is closer than you think, and the catalog of camps will be available Feb. 4 at [Lakewood.org/Camps](#). Registration for camps will open at 10 a.m. on Feb. 11.

Nighttime construction

The city will allow construction to occur at nighttime for a project to restore pavement following the installation of a new gas main in the intersection of South Pierce Street and West Mississippi Avenue. The work is scheduled for Jan. 25-Feb. 8.

In the Community

More hours to help those in need

[The Action Center](#) has added the second and fourth Saturdays to its regular program hours for picking up prepacked grocery boxes and clothing for those in need. The hours are 10 a.m. to noon on those days at 8745 W. 14th Ave.

Better service for job seekers and businesses

Jefferson County's Business & Workforce Center has launched a [newly renovated website](#) to better serve job seekers, businesses and community members. The center provides resources to create successful connections



Jefferson County Sheriff's Office

January 7 at 1:27 PM

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54

8 Comments 40 Shares

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Jeffco Sheriff  @jeffcosherriffco · Jan 7

⋮

Hey #Jeffco! Help the JCSO Emergency Management team prepare for disasters and emergencies! We need your input to better understand our vulnerabilities & ways to reduce the impacts of hazards. Take a short 8 question Hazard Mitigation Plan Survey at bit.ly/JeffCOHMP today!



 10

 20





Jefferson County Multi-Hazard Mitigation Plan Update

Hazard Mitigation Plan Kick-Off Webinar
December 7, 2020 – 9:30am-11:30am

Join at
slido.com
#47527



Jefferson County Multi-Hazard Mitigation Plan

Comprehensive Update
April 2016






JeffCo Kickoff Meeting: Dec 7, 2020 - 9:30-11:30 AM

Unlisted

11 views • Jan 11, 2021



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WandaVision Episode 3: Every Easter Egg + ENDING...



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City Government

@lakewoodgov

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Lakewood Colorado City Government

June 4 at 8:21 AM · 🌐



Jefferson County Sheriff's Office ✓

June 3 at 5:36 PM

Help JeffCo mitigate hazards and prepare for disasters and emergencies!

Join us for our 2nd virtual public meeting on June 8th at 5:30pm.

The purpose of this ...

See More

Like

Comment

Share



Lakewood Colorado City Government

January 11 at 3:17 PM · 🌐

Your opinion needed - let Jefferson County Sheriff's Office know what you're concerned about regarding present and future hazards in the county and city.

Virtual meeting Thursday, more details below:



JOIN US FOR OUR FIRST PUBLIC MEETING THURSDAY, JAN 14TH @ 5:30PM

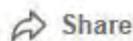
Jefferson County Sheriff's Office ✓

January 11 at 2:48 PM

Help the JCSO Emergency Management team prepare for disasters and emergencies!

Join us for our first virtual public meeting this Thursday, January 14th at 5:30p...

See More



City of Lakewood, Colorado Retweeted



Jeffco Sheriff  @jeffcosherriffco · Jun 9

Hey #Jeffco! Help us review & provide input to the Hazard Mitigation Planning Committee for the HMP plan update.

The Plan is open for review and comment from June 7th – June 25th. The virtual public meeting forum and comment form can be found here:

bit.ly/HMPCJune7





City of Lakewood, Colorado @LakewoodColo · Jan 11



Your opinion needed - let @jeffcosherriffco know what you're concerned about regarding present and future hazards in the county and city. Virtual meeting Thursday, more details below: 📍



Jeffco Sheriff ✓ @jeffcosherriffco · Jan 11

Public participation sought for #Jeffco Hazard Mitigation Plan. Your engagement and feedback are key to our success in planning and reducing the impact of disasters in Jeffco. Join us virtually on Thurs @ 5:30 pm! For more info & to register, visit bit.ly/JCSOHMP



JOIN US FOR OUR FIRST PUBLIC MEETING THURSDAY JAN 14TH @ 5:30PM





wood.

Jefferson County Multi-Jurisdictional Hazard Mitigation Plan Update

Public Meeting #1

January 14, 2021 – 5:30-7:30pm

Jefferson County Multi-Hazard Mitigation Plan

Comprehensive Update
April 2016



Video player controls: Play, Next, Volume, 0:09 / 1:41:47, and a row of participant icons labeled JS, JJ, JP, DK, MW, D, HM, DH, PO, and JR.

Jeffco Hazard Mitigation Plan Update January 14, 2020, Public Meeting

91 views • Jan 19, 2021

Like 0, Comment 0, SHARE, SAVE, ...



Effectiveness of Wildfire Mitigation Activities in the...
swfirescience
1.9K views • 4 years ago



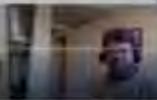
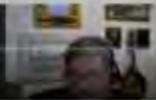
Jefferson County Hazard Mitigation Plan Update

Hazard Mitigation Planning Committee – Meeting #2 – Risk Assessment

January 11, 2021 – 9:30-11:30am

Jefferson County Multi-Hazard Mitigation Plan

Comprehensive Update
April 2016



All

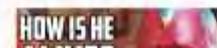
Recently uploaded



SHARE



SAVE



WandaVision: Every Clue About How Vision Returned from the...

Public Feedback Survey Results

ID	Select affiliation (select one):	Please provide comments regarding the Draft Update of the Jefferson County Hazard Mitigation Plan here:
2	Member of the Public	
3	Member of the Public	jdhfjhd
4	Member of the Public	<p>The plan does nothing to address the need for improved land management policies, planning, and growth management by JEFFCO with respect to the wildfire threat. For example, Aspen Park is the number one at risk community in the State and in the top 1% of at risk communities in the US [USFS and Headwaters Economics]. The wildfire risk is extraordinary. Extraordinary risk requires extraordinary risk reduction measures. JEFFCO land development regulations, zoning, adopted codes, and planning simply do not account for this level of risk. Planning and Zoning and Building Safety must review their policies, standards, regulations, and codes given the recent knowledge from wildfire loss in the last two years from fires, especially in California. JEFFCO must account for the capabilities and limitations of mountain area fire departments with respect to their ability to adequately protect the existing communities and anticipated growth in mountain areas. Additionally, evacuation planning, capacity assessment, and route mitigation has never been done as part of wildfire risk reduction.</p>
5	Member of the Public	When will the jurisdictional annexes be shared with the public?
6	Member of the Public	the EFPD annex seems to be missing reference to last year's Elephant Butte fire. also section I.2.1 seems to still be old information

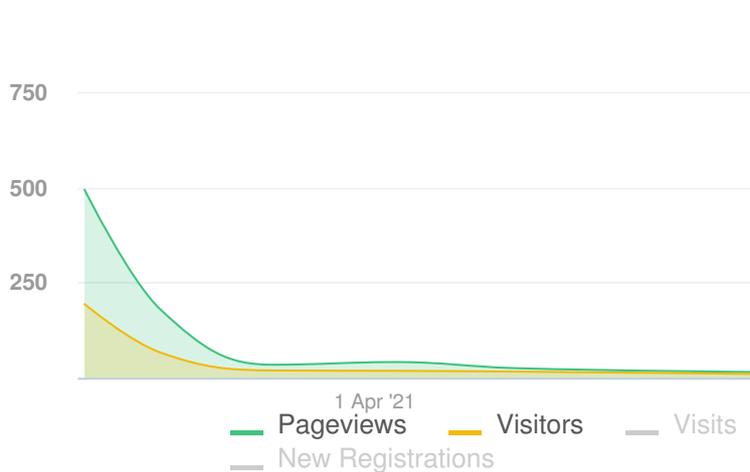
Project Report

25 July 2018 - 29 June 2021

Speak Up Arvada Hazard Mitigation Plan Update



Visitors Summary

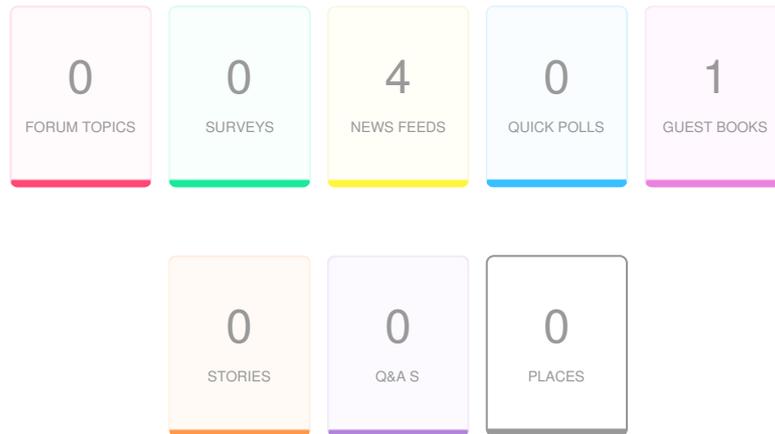


Highlights



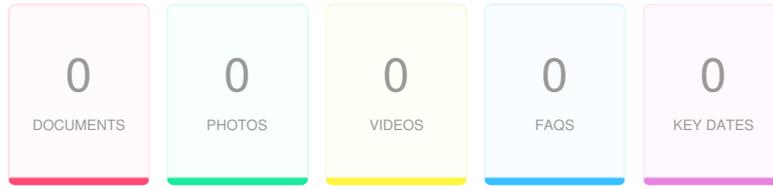
Aware Participants		Engaged Participants	
	295		6
Aware Actions Performed	Participants	Engaged Actions Performed	Registered Unverified Anonymous
Visited a Project or Tool Page	295		
Informed Participants	44	Contributed on Forums	0 0 0
Informed Actions Performed	Participants	Participated in Surveys	0 0 0
Viewed a video	0	Contributed to Newsfeeds	0 0 0
Viewed a photo	0	Participated in Quick Polls	0 0 0
Downloaded a document	0	Posted on Guestbooks	6 0 0
Visited the Key Dates page	9	Contributed to Stories	0 0 0
Visited an FAQ list Page	0	Asked Questions	0 0 0
Visited Instagram Page	0	Placed Pins on Places	0 0 0
Visited Multiple Project Pages	25	Contributed to Ideas	0 0 0
Contributed to a tool (engaged)	6		

ENGAGEMENT TOOLS SUMMARY



Tool Type	Engagement Tool Name	Tool Status	Visitors	Contributors		
				Registered	Unverified	Anonymous
Newsfeed	Project Updates	Published	6	0	0	0
Newsfeed	Video Recording of Jan. 14 Public Meeting	Published	1	0	0	0
Newsfeed	Video Recording of Dec. 7 Planning Kickoff Meeting	Published	1	0	0	0
Newsfeed	Video Recording of Jan. 11 Planning Meeting	Published	0	0	0	0
Guest Book	Public Comments	Published	20	6	0	0

INFORMATION WIDGET SUMMARY



Widget Type	Engagement Tool Name	Visitors	Views/Downloads
Key Dates	Key Date	9	9

GUEST BOOK

Public Comments

Visitors 20	Contributors 6	CONTRIBUTIONS 6
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<p>07 February 21</p> <p>Carmen G</p> <table border="1"> <tr> <td>AGREES</td> <td>DISAGREES</td> <td>REPLIES</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> </table>	AGREES	DISAGREES	REPLIES	0	0	0	<p>Something needs to be done about the homeless camping at I25 and Kipling. Garbage, begging, drugs and general filth left. The police get called but nothing seems to change. We are not a ghetto and I've certainly seen this area change in the past 5 years. Does anyone else feel this way?</p>
AGREES	DISAGREES	REPLIES					
0	0	0					
<p>22 February 21</p> <p>Jean RS</p> <table border="1"> <tr> <td>AGREES</td> <td>DISAGREES</td> <td>REPLIES</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> </table>	AGREES	DISAGREES	REPLIES	0	0	0	<p>Floodplain, riparian corridor, and open space protection are issues of critical concern. New and existing developments adjacent to these sensitive areas should be regulated and monitored so as not to negatively impact these resources. Stormwater runoff needs to be closely regulated and monitored especially during severe precipitation events. We have experienced flooding beyond "floodplain limits" in recent past along the Ralston Creek.</p>
AGREES	DISAGREES	REPLIES					
0	0	0					
<p>05 April 21</p> <p>Mmcgilvray</p> <table border="1"> <tr> <td>AGREES</td> <td>DISAGREES</td> <td>REPLIES</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> </table>	AGREES	DISAGREES	REPLIES	0	0	0	<p>Disaster events will become less and less predictable with climate change. I suggest the city take a harder look at integrating resiliency into the Comprehensive Plan and other guiding documents (including the HMP). A 5-yr timeline for identifying risks and mitigation goals seems pretty short sighted.</p>
AGREES	DISAGREES	REPLIES					
0	0	0					
<p>09 April 21</p> <p>cemcd</p> <table border="1"> <tr> <td>AGREES</td> <td>DISAGREES</td> <td>REPLIES</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> </table>	AGREES	DISAGREES	REPLIES	0	0	0	<p>Please reconsider an Amazon facility at 68th and Indiana. Residents and access to retail businesses will be negatively affected as well as people who often travel this corridor. Surely there is another location to consider which has the road infrastructure to accommodate multiple large vehicles.</p>
AGREES	DISAGREES	REPLIES					
0	0	0					
<p>27 April 21</p> <p>Rk149004</p> <table border="1"> <tr> <td>AGREES</td> <td>DISAGREES</td> <td>REPLIES</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> </table>	AGREES	DISAGREES	REPLIES	0	0	0	<p>Ralston Creek reshaping/widening projects, runoff mitigation/regulation, and other mitigation projects along the Ralston Creek corridor to minimum flooding risks.</p>
AGREES	DISAGREES	REPLIES					
0	0	0					

GUEST BOOK

Public Comments

11 May 21			<p>We moved to Arvada five years ago and bought a house in a floodplain near Ralston Creek, being told by the owner that insurance would cost \$1,000/year, hearing about a flood mitigation plan the city was coordinating with the U.S. Army Corps of Engineers and knowing that the city had recently done work on Van Bibber Creek. So we believed it would be a short-term situation. Five years later, nothing has moved forward and our insurance costs \$2,200/year. Most concerning, climate change will only heighten the risk. It feels like our entire neighborhood has been ignored as other massive projects move forward in the city, so I'm hopeful the city will take action quickly to preserve homes in an area that could soon become a historic neighborhood and that recently has attracted a lot of young families.</p>
fbauters			
AGREES	DISAGREES	REPLIES	
0	0	0	



COLORADO

Division of Homeland Security
& Emergency Management

Department of Public Safety

Brian Daley, Director
JEFFERSON COUNTY
800 Jefferson County Parkway
Golden, CO 80401

October 25, 2019

Re: Pre-Disaster Mitigation Program Grant Award Letter 18PDM20JEF

Dear Mr. Daley,

The Colorado Division of Homeland Security & Emergency Management (DHSEM) is pleased to inform you that your application for funding pursuant to the 2018 Pre-Disaster Mitigation program is approved in the amount of **\$70,000.00** (funding source: Federal Funds). Project funding award is based on the project description provided in the application and outlined in the following table:

Description	Federal Share	Required Non-Federal Local Share	Total Project
Hazard Mitigation Planning Activities	\$70,000.00	\$23,425.00	\$93,425.00
Total Award Amount	\$70,000.00		

DHSEM will issue your grant award as a Small Dollar Grant Agreement (SDGA). The issuance of a SDGA functions like a ‘purchase order’ for requests for reimbursements (RFRs) in the State financial system, and **does not** require original signatures on a formal agreement from your approving authorities, as done in the past, in order to reduce unnecessary delays in processing formalized agreement documents and your awarded projects.

To issue the SDGA, DHSEM must receive the following up-to-date forms (included with this letter) submitted electronically to Mark Thompson, markw.thompson@state.co.us:

1. W-9
2. EFT form
3. Letter of Acceptance signed by Authorized Signatory (See attached)

After receiving the above mentioned required forms, DHSEM will issue the completed SDGA and terms and conditions for your grant award to you.

The period of performance for the PDM 2018 SDGA is from **October 2, 2019 to April 1, 2021**. All requests for reimbursements must cover work completed, or expenditures claimed, within this period of



COLORADO

Department of Public Safety

700 Kipling Street, Lakewood, CO 80215 | www.colorado.gov/publicsafety

Jared Polis, Governor | Stan Hilkey, Executive Director

performance. Quarterly RFR and Progress Report submissions will continue to utilize the EMGrants Pro system.

For questions regarding your SDGA or the Pre-Disaster Mitigation program, please contact **Mark Thompson** at (720) 630-0770 or markw.thompson@state.co.us, or **Patricia Gavelda** at (970) 749-8280 or patricia.gavelda@state.co.us.

Please feel free to contact me at (303) 239-4183 or Larisa.Cannon@state.co.us if you have further questions. Thank you for your assistance in managing this grant award.

Sincerely,



Larisa Cannon
Grants and Contracts Manager
Division of Homeland Security and Emergency Management

CC: File



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Jared Polis, Governor | Stan Hilkey, Executive Director



COLORADO

Division of Homeland Security & Emergency Management

Department of Public Safety

Office of Grants Management

8000 S. Chester Street, Suite 575

Centennial, CO 80112

Letter of Acceptance

October 25, 2019

Encumbrance Number: 18PDM20JEF

Subrecipient Name: Jefferson County

Grant Name: 2018 Pre-Disaster Mitigation

This letter serves as notification and acceptance of the Small Dollar Grant Agreement (SDGA) for the 2018 Pre-Disaster Mitigation program in the amount of **\$70,000.00** issued by the Colorado Department of Public Safety, Division of Homeland Security and Emergency Management (CDPS/DHSEM).

By signing below, the agency, in accordance with acceptance, acknowledges the receipt, review and concurrence of the provided terms and conditions, scope of work, and any additional requirements identified. Additionally, the following required documents are provided for issuance of the award through the State financial system and accompany this letter of acceptance:

1. Current *Request for Taxpayer Identification Number and Certification (W-9)* form
2. Current *Electronic Funds Transfer (EFT)* form

By signing and returning this letter, the undersigned holds authority to enter into, and understands and accepts all the terms and conditions outlined for the Small Dollar Grant Agreement referenced above.

By (Printed Name): _____

Title: _____

*Signature

Date: _____



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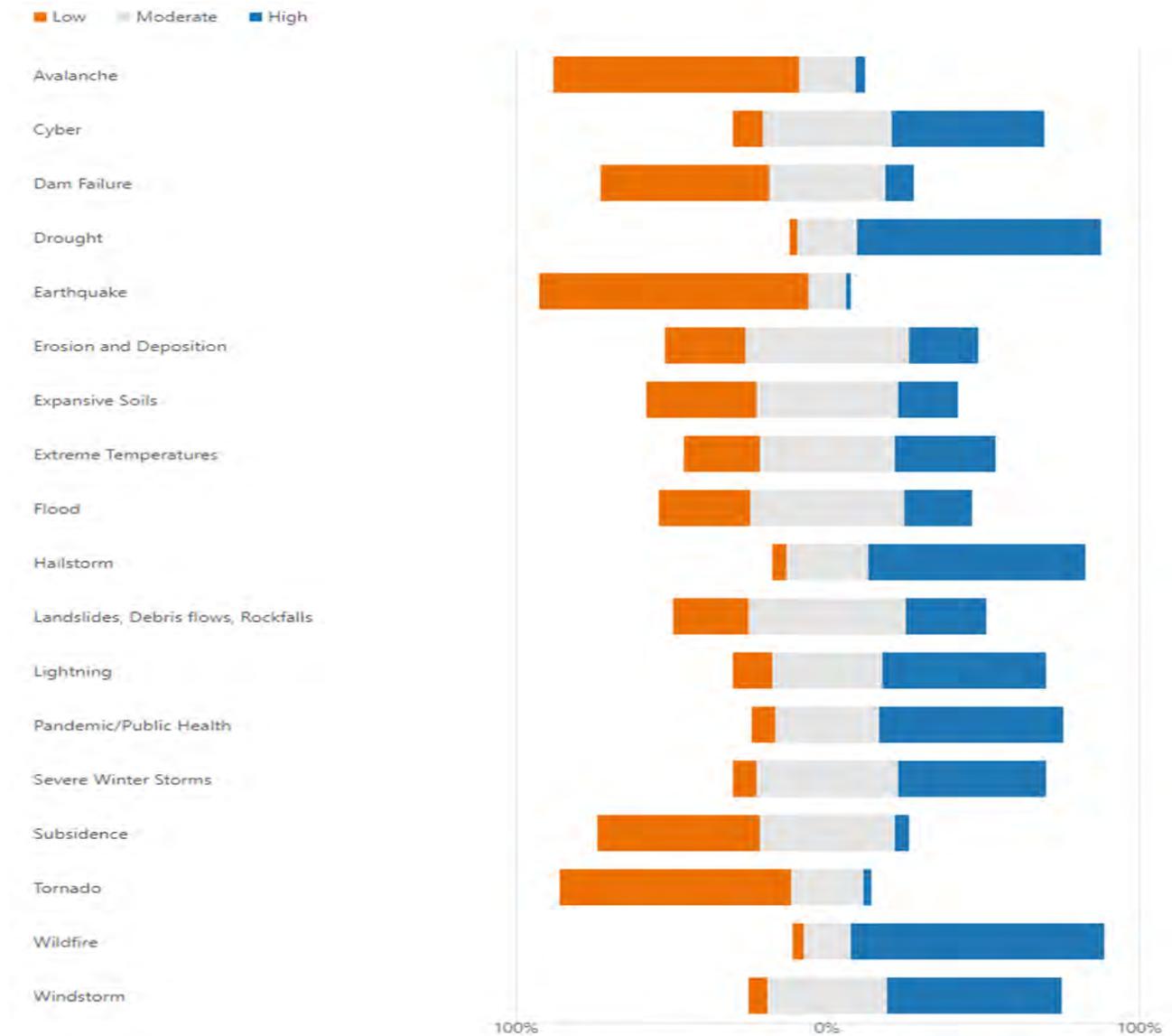


APPENDIX D: PUBLIC SURVEY RESULTS

As part of the planning and public engagement process of the Jefferson County Hazard Mitigation Plan, a 5-question web-based and hardcopy survey was created and distributed via numerous channels. The purpose of the survey was to collect information from the public and stakeholders to better understand the perception of hazards in Jefferson County.

The online survey opened on 1/11/2021 and closed on January 31, 2021. The link to the survey was distributed via email to members of the Hazard Mitigation Planning Team, who were encouraged to broadcast the link far and wide through their constituent networks. A total of 953 responses were collected. The following charts and graphs summarize the data collected from this effort.

Question 1: The hazards addressed in the Hazard Mitigation Plan update are listed below. Please indicate the level of significance in Jefferson County that you perceive for each hazard.





Question 2: How many times has a natural hazard disrupted your daily life in the last five years?

● 0	122
● 1-2	459
● 3-5	247
● More than 5 times	121



Question 3: Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

- Wildfire risk / drought and overpopulation in Evergreen
- We live in the Ken Caryl valley, and I feel the biggest threat for us is wildfire. We have had a couple small fires nearby...just enough to make residents worry.
- Jeffco needs to plow all streets, not just major streets.
- Wildfires, drought, blizzards,
- Wildfire mitigation – Evergreen
- Wildfire needs to be a priority
- The inevitable wildfire.
- Winter storm closing schools unexpectedly causing me to miss work to care for my children.
- Smoke from wildfires
- Traffic flow for evacuations along the US-285 corridor. (Conifer)
- Recognizing that we do have tornados and high winds in Jefferson county. Encouraging logging, especially in beetle kill areas, to help prevent the disasters like we saw this year. Pursuing a reasonable path when epidemics or other health challenges affect the citizens of Jeffco.
- Wildfires and aftereffects of mudslides/rock fall C-470 - I-70 corridor
- Wind-swept fast-moving wildfires
- Concerned about drought and evacuation with all of the new building in Evergreen and mountain communities.
- Hailstorm Golden CO
- Wildfire mitigation... foothills
- Disaster preparedness and emergency response
- My well went virtually dry at the end of this fall in Conifer.
- Fire mitigation. There are a lot of fallen and dead trees in the Evergreen Meadows West subdivision especially on property that it is unclear who owns it.
- Since jeffco is a wide area the mountains and city should have different issues; ex: city doesn't need an avalanche warning.
- Rockslides in the mountains on Highway 70 and 285.
- Fire and covac
- Evac during elephant butte fire 2020.
- Snow plowing 80123. Please remove our snow and ice dams
- Wildfire - Conifer/Richmond Hill Corridor
- Wildfire and Forest Management



- While not considered a disaster, more could be done about the frequency of wildlife (bears and mountain lions) hanging out in my area (Dutch Ridge Neighborhood of Jeffco). There were quite a few reports of them in peoples' front and backyards in urban areas. Seems potentially dangerous.
- Emergency evacuation preparedness for natural disasters.
- Morning traffic buildup on Hwy 470 as one approaches Hwy 285 heading towards I-70. That's hazardous!
- Drought: The impact of low reservoir levels and aging pipelines on Lookout Mountain Water District customers.
- Need to consider WUIs in some parts are the county.
- Updating old/failing/inadequate infrastructure within Lakewood. Flooding caused by snowmelt and/or heavy rains can cause serious damage to roads and properties that can be very expensive to fix. Increasing our resiliency to any form of attack by improving our energy grid to be more local.
- Wildfire damage rebuilding Businesses dying and shutting down
- A safe place for people and livestock to go in evacuation.
- Hail Fires
- Yes Hwy 285 several times a month the hwy gets shut down due to Semis rolling over, and also vehicles rollovers, motorcycles crashing due to black tar put down for cracks in the Asphalt all along the hwy in the canyon between hwy 8 and Parmelee Gluch Rd. Snow stroms big or small cause major issues in this same area as Semis have nowhere to chain up as the weather can be fine at hwy 8/Morrison rd exit then a 1/2 mile up or less is all snow.. the bridge going over hwy 285 at Parmelee Gluch Rd is need of major repairs.
- Wildfire risk mitigation along the 285 corridor (Conifer, Aspen Park, Kings Valley, Bailey).
- Need to have the Jefferson County fairgrounds available for emergency evacuations and other emergencies!
- Who's actually putting out fires? Fires. Fires. Fires. Fires. Car vs Deer. Fires. Car vs Deer. Icy roads. Vehicle sliding off 285 cliffs x 1,000
- Hailstorms, fire, flood
- Wildfire drought & windstorms
- Pandemic, tornado warnings
- Wildfire for people in the mountain communities has become a constant threat. There absolutely should be a reliable means to contact people. Any new developments should be planned with more than one route for ingress/egress.
- Nuclear accident
- Always about wildfire!
- Moved to Colorado from earthquake country in 2014, trained in CERT and amateur radio, was surprised how little citizen involvement we have in Colorado for emergency preparedness and response.
- Homeowner Fire Mitigation
- Wildfire
- Fire mitigation and evacuation planning
- Residential changes to flood plane and building illegal fences blocking access to infrastructure
- With the fire danger, we have had to consider where to move our horse and the jeffco fairgrounds not only provides a place to do that in an emergency, but provides other resources for our youth.
- Wildfires are a HUGE concern. Having a plan in place. Having a place to evacuate large animals (horses) to ahead of evacuation notices, etc.
- flash flooding - clear creek cooridor, Lena Gulch (apex drainage),
- Of all the hazards, wildfire is the single one that can destroy multiple communities in a few days
- More fire mitigation



- City of Westminster experiences hail and high winds REGULARLY, and the winds often catch new residents completely off-guard. Most houses are built on expansive soil & have had or need foundation amendment. Drought is far more likely than flood. Ketner & Standley Lake dams have decent spillways. We definitely get snow-bound once or twice every 10 years, but only for a day or two. Tornadoes usually happen further east but should not be completely ruled out. Cyber crime threat is real, but I can't imagine an attack that would heavily impact everyone at once: it's far more likely that internet connections would be severed. I am concerned about the current allowance of fire pits within city limits: things get too dry & there's just too much risk. I think we've weathered the pandemic reasonably well, because most of our citizens & residents are well-informed and wise.
- wildfire maintenance.
- Covid 19...All counties Fire...smoke..air quality... Jefferson Heat...All counties
- Lost fence to wind, vehicles damaged by hail, house damaged by hail, blizzard
- Wildfire, tree mitigation
- Fire mitigation and fire evacuation routes
- Continuing to build more housing in the evergreen area without more road as evac routes
- I'm concerned about erosion along Big Dry Creek, specifically the oxbows forming near Old Wadsworth bridge.
- We need to make sure we have evacuation areas for livestock, such as the Jeffco Fairgrounds. It is a central and safe location that has the necessities for evacuation.
- Fire Mitigation - There are many homes in Coal Creek Canyon. Many of those are on property that is dangerously overgrown and/or has excessive down trees and debris. It would be nice to see a serious effort/programs by the County to stress fire mitigation on private property.
- Maxwell Falls Trail head traffic and trail fires. (I know it's Federal Land) No Biking Resort in Conifer
- Wildfires and floods and safe evacuation routes, shelters for people, animals and livestock. Jeffco foothills and mountain areas.
- Wildfires, floods etc. and evacuation plans. This includes small and large animals. Where exactly will people evacuate large animals if the Fairgrounds is closed? This would be the entire county.
- Wild Fires
- Conifer. Wildfire.
- Wildfires
- Support for rescuing animals during hazard issues
- Fire Mitigation
- Fire mitigation in the mountains
- We are in constant danger of wildfires and need a place to evacuate.
- Wildfire is the largest threat in jefferson county and having evacuation places for people and livestock is essential.
- Fire Danger in Evergreen
- Road congestion during wild fire evacuation. It is horrible at our location. This is a significant reason that changes to zoning should not occur.
- Wildfire mitigation
- Wildland fire. Coal Creek Canyon. Need seriously aggressive forestry to reduce fuel overloading. Not the opposite approach the county is currently taking by prohibiting all burning and most fuel harvesting, and CHARGING residents for slash disposal. Seriously?!
- Property owners of 10+acres should be offered free assistance in forest mitigation.
- 1) Wild land fire evacuation routes Conifer, CO (Kings Valley) 2) Higher signal strength for communications Pandemic.
- Snow storms in Jeffco mountain regions



- Need to consider current threats and increasing threats associated with climate change...wildfire, extreme heat, increased frequency of severe storms, drought, pest outbreaks, changing disease vectors, supply chain disruption etc. Historical thresholds are no longer are reliable indicators of the types of hazards and disruptions we face.
- All of these hazards apply to Colorado, and Jefferson county has so of the terrain in one.
- Increased mitigation along Rt 72 easement especially near Wondervu in Coal Creek Canyon. Lower the cost on truck/trailer slash loads in CCC...Boulder and Gilpin counties are free. Update the Community Wildfire Protection Plan for CCC from 2008.
- Animal welfare during emergencies. It is great to have a designated safe location for animals/livestock at the Jeffco Fairgrounds.
- wildfire, evergreen
- The popular hiking areas of brook forest, and shadow mountain. The traffic has increased 5 fold in the past two years with increased illegal camping and fires being left unattended, along with cars and hot exhaust parking in the weeds and grass
- Fire Mitigation throughout the county...
- Gun violence, Jeff Co.
- Watersheds are not properly managed specifically on privately owned property. Education and financial assistance would go a long way to advert the impact of floods. Forestry management, again on private owned lands could use educational and financial assistance. Assist landowners through education and those that cannot afford mitigation efforts with grants.
- Wildfire mitigation (evergreen)
- flooding on mountain feeder streams /foothills snow removal / entire county in various forms
- We need our fairgrounds for evacuation this is critical
- Wildfires, sever weather (wind/hail)
- I worry about the most recent wildfires earlier this year and how the lack of vegetation could recreate avalanches and mudslides like we saw in Rocky Mountain National Park years ago.
- "Winter storm Hailstorms "
- Rodents
- Keep Jeffco Fairgrounds
- Fire mitigation, severe weather support, public safety, public health.
- Forest management with regard to fire control.
- Wildfire evacuation area for Jefferson County resident-owned horses. The fairgrounds is a good place but might be inadequate capacity for a major fire or natural cause type event. So please consider adding perhaps large fenced areas such as a school yard, sports field, etc., in locations around the county.
- forest fires
- 93 needs two lanes both directions from Boulder Count through Jeffco
- Wildfires, mitigation, water shortages and the expansion of property developments and higher populations that areas cannot support.
- Pandemic vaccination protocols and acceleration. Evacuation process and routes and quality and redundancy of major evacuation routes. Wildlife impacts and education to protect people and maintain healthy wildlife population. Drought driving them into neighborhoods creating risk combined with overpopulation of some species.
- Just how to mitigate wildfires given the events of last year.
- Keep the Jeffco Fairgrounds available for a safe haven for livestock/pets/horses when there is an emergency at hand.
- The animal evacuations to the fairgrounds are very important.



- South Jeffco --- Foothills Park & Rec District area.....Pedestrian tunnels on trails in this area flood fiarly often(either rain or snow melt) ... even a few inches of flowing water can knock a person off their feet. There aren't any water depth markers painted on exterior walls at the entrances to any of the pedestrian tunnels in my area (Dutch creek trail, Lilley Gulch trail, etc) .. no warning signs posted about danger of going through flooded pedestrian tunnels
- An extended utility/power interruption tied to another event such as fire, windstorm, or ice storm that could make recovery much more difficult or increase the impacts.
- I think our Fire Department has done an excellent job of keeping us safe. I would like to see the local sheriff's department do "drive-throughs" in all neighborhoods at random times. Just to let us know you are watching for anything unusual.
- Coal creek canyon.Snow storms that great power outages. There is no way to live in my home with out power.
- Power outages caused by wind/snow storms seem to be the most impactful issue.
- Roads
- Community wildfire mitigation and preparation planning
- Wildfire Evacuation
- People need to consider putting surge protectors on there electrical boxes. A lightning strike took out \$3000 worth of electrical wiring.
- We need to continue to mitigate for wildfires.
- Nothing that hasn't been considered to date in Wheat Ridge.
- Grizzly Gulch going up from Beverly Heights above Golden has a culvert under Lookout Mountain Road that has a partially obstructed outlet. Jurisdiction is unknown.
- The biggest threat in Jefferson County are all the tent cities. I've personally been threatened by people coming out of a tent before. The amount of trash, human waste, smell, and theft from them have me avoiding them. I dont ride my bike on trails I used to frequent and have started looking for alternative ways to get outside where I wont come in contact with tent cities.
- I live in Arvada and so blizzards, high winds, hail are the biggest factors that impact daily life. It's all weather related so not sure what more you can do. We have systems in place for these things.
- Wildfire, Jeffco-unincorporated
- See Evergreen & Bailey 2020 CWPP. Significant wildfire risk with substantial potential for loss of life.
- Snowplow activities on 38th Avenue, Youngfield Street, 32nd Avenue (west of I70) are all severely lacking, even in less than extreme snow events.
- Fire evacuations.
- The public needs to be informed if they are in a FEMA declared possible flood area from extreme rainstorm or earthquake that could rupture dams. Now the public only gets info if they go online and know where to check. Perhaps county wide brochures with info on possible hazards and what to do if power goes off, there is an earthquake or flood from weather or failing dams. Dams that are in bad shape need to be fixed.
- I appreciate the amount of fire mitigation that the county continues to do in the Conifer Area and would like to see it continue forward. I would also like to see the county putting in for more FEMA pre disaster mitigation grants that could allow the public to submit to participate in fire mitigation on private parties as a community, just as the Conifer and Evergreen communities.
- Snow is typically the vast majority hazard that I've encountered. Fires have been a hazard that my family has been impacted by, especially as the result of the drought. I feel that the Jefferson County Fairgrounds was beneficial for assistance. Really I believe it's important to leave the Fairgrounds in place as part of the contingency plans to help the community.
- Fire, flood and emergency evacuation plans for residents, pets and livestock
- Evacuation routes for residents in the event of wild fire;



- Wildfires
- Uranium mine next to Ralston Creek upstream from Ralston reservoir
- Cyber attacks, aging JeffCo population
- Winter road conditions and fires
- Grassland fires in unincorporated areas.
- Danger of wildfires and ability to control them.
- Tree and plant mitigation, wildfires are going to get worse. But also have the private property owners have to mitigate too or be served with higher property insurance costs
- There are ample geologic hazard resources published by the Colorado Geological Survey and USGS that should be considered when evaluating geologic hazards. I would say these most apply to zoning/planning; however, existing landowners could be made more aware of these hazards so they may purchase landslide insurance.
- Standing Pine Beetle kill & removal of those trees
- Wildfire
- Still too much slash along Bear Creek Open Space Trails. Trails are very close to houses so the need to remove/chip it should be a priority esp in these very dry weather times. Many homeowners are not responsible for caring for their trees and landscaping allowing branches to become hazards for cars and people. We are headed for drought...stop building car washes.
- Pandemic. First time we have experienced a pandemic in our lifetime. I am sure we will have more clarity surrounding future protocols as we continue to figure out best practices.
- Wildfire mitigation and evac planning. We live close to the national forest and would like to see more mitigation done in there. I'm currently working with ECFD to establish a community mitigation effort and while we will work to handle our community we would like to see something done in the national forest as it is a significant hazard due to poor management.
- Travel along highway's and other roadways is treacherous during winter storm events and just afterwards with the lack of crowning of roads to allow for water drainage and preventative pooling. Most notable along 6th avenue.
- I was impacted by the 2013 floods in Greeley- I do believe we need better community planning around flooding issues.
- I just found out that my identity was stolen and used to defraud the State of Colorado around unemployment funds. For our family, this is the second time we are dealing with this type of issue. Cyber criminality and fraud are really impacting our community. We need better education and protection.
- Our home was damaged by major hailstorms twice in 20 years. It seems to be within norms for our area. Can we study the issue and come up with building codes/materials that are more resistant?
- The pandemic has exposed so much inequity and need. Beyond job loss, food and housing insecurity, we are also dealing with inequity in health care and education access. And now, we are also dealing with a series of small criminality- stolen mail, personal items and vehicles. "
- Flooding/runoff along van bibber creek ralston creek and clear creek.
- Trains carrying hazard materials. Likewise with in the trucking industry.
- Invasive weeds. Are a prt wildfire hazard but could deserve separate consideration. Also play into erosion.
- Fire mitigation on Conifer mountain. Kings valley.
- In Jefferson County I think the main hazard is the over reach by government official's and implementing programs that they think they are the best. The results are that the tax base is severely affected and I am sure that there will be a push to increase taxes, because the budget has shortfalls. This applies to the state also. The pandemic is the cause.



- When we have hail storms I think many home owners are vulnerable to hire the company that is canvassing the area and many people get taken advantage of or completely ripped off.
- Wildfire
- "Evacuation routes - Transportation and Engineering
- Chain of Command - all"
- There are a significant amount of large, older trees with branches that need pruning as they become dangerous in wind and snow storms to property and passing vehicles. Also, there are many irrigation ditches along roadways that are used by the city as stormwater drainage often overflow and cause flooding in severe rainstorms. These ditches need to be maintained by the city and not just the users of the irrigation water.
- smoke from wildfires, many of which are outside of Jefferson County, but smoke drifts in and harms air quality. Not sure which jurisdiction this would apply, as fires don't have anything to do with jurisdictional boundaries. Avalanches, as noted in the list above, do occur in counties to the west of Jefferson, but not in Jefferson itself.
- Widespread and prolonged power outages
- Develop enough operational resources to have an positive impact on an emergency.
- Conifer area: tree mitigation is critical. With increased traffic on 285, evacuation access is a concern for me as a resident. Work to find grant programs for residents to use to conduct tree mitigation or invest in community organization and education programs. Demonstrate a focused community program and create goals on fire mitigation.
- Building above Brook Forest and Lynx Lair in Evergreen. Poorly engineered road and possibility of storm water and erosion on property below.
- Wildfire mitigation for Conifer
- Snow storms and lack of alternative routes when the highway is closed down
- High Density Development impact to Wildfire evacuation routes.
- I think a good plan of attack in the Evergreen area is to spend money on well equipped Brush Trucks and have volunteer fire fighters take them home with them. This way they be available at a moments notice and would be spread throughout the Evergreen fire district. I believe that this action could prevent a lightening strike caused fire from having time to grow into a much larger fire.
- Riots social unrest.
- Flooding from Clear Creek Wildfire Wind and weather issues Cyber Pandemic These are concerns in the City of Golden
- Fire
- Our limited survivable evacuation routes are serious threats to Evergreen's public safety. Also, upper Bergen Creek's elevated flood potential has caused significant property damages including destroyed culvert bridge, residential access road, flooded homes and deep channel erosion. This flood threat results from continious developments with no effective flood controls.
- My biggest concern is being able to evacuate people quickly enough in the event of an out of control wildfire such as in Paradise, California.
- Pandemic, Wildfire, High Winds
- Prescribed fire. Pile burning and broadcast burning after mechanical treatments.
- Evacuation routs ion case of wildfire in Evergreen/Bergen Park
- Fire, lack of water in south evergreen
- Wildfire mitigation and evacuation- Jeffco/Evergreen
- wildfires
- Thoughtful evacuation planning and communication of same to citizens/businesses in the area
- wild fire in Evergreen
- Wildfire and drought



- Evacuation from Evergreen during wildfires have been disasters.
- I am concerned about wildfires
- South Evergreen- road access in case of evacuations, wildfire and or spreading house fires that would be spread due to lack of mitigation, lack of water to fight fires.
- obviously the pandemic, also the smoke from wildfires was pretty bad at times this year
- encourage all communities to work out a wildfire plan
- Wildfire in foothills of golden adjacent to neighborhoods.
- Living in north Evergreen, I serve on the HOA Board for the Ridge community (411 homes). Above all else, residents express concern for wildfire risk and evacuation routes as related to newly proposed developments. Specifically, the risks presented by high density developments that would result in choked exits from the Ridge neighborhood. Additionally, the Ridge HOA has a Forestry Committee and spends a great deal of resources on forest management, mitigating fire risk, achieving Firewise and CWPIP designations, and educating its community on defensible space.
- None. I used to be on Clear Creek's CERT group and have material on most of the hazards we're likely to experience.
- Unincorporated Jefferson County. One way ingress and egress subdivisions. Places for large emergency vehicles to turn around.
- electricity reliance in the mountains- my neighborhood has power outages all the time- which in turn means nothing else works including those with water pumps. Fire is another big issue- my neighborhood is especially at risk- Echo Hills
- 1. Wildfire 2. Flood/Dam threatened 3. Hail Unincorporated JeffCo Evergreen area
- Evacuation and wildfire pre-plans should be a high priority for Jeffco.
- Beetle killed trees and no mitigation on Jeffco land is causing serious fire hazards within the county. Sadly, it's a problem throughout the state.
- Wildfire is the #1 natural disaster facing JeffCo at this time, I believe. Evergreen area is considered at one of the top 10 national sites most in danger of a catastrophic fire Depending only on pre-evacuation orders to get people out safely is short sighted. The second most likely natural disaster I think is an extreme weather event which is a result of climate change (snow, rain, wind,...)
- Fires
- Erosion disrupted well lines , severe hail storm damage to autos
- Severe winter storms and wild fire in the Golden + Evergreen, CO areas
- Wildfire and I-70 closure requiring Spring Ranch to have access to Genesee Park access road which is now locked
- Wildfire mitigation
- Wildfire coming from direction of Evergreen
- Wildfire mitigation in the foothills.
- Hail is #1. I'd then say cyber, windstorm, and current pandemic. Also context of climate change for all possible issues, esp fire.
- Is there an emergency operation plan in place for current hazards? Does Edgewater have an EOC?
- Flooding at 26th & Harlan
- Flooding. My crawl space at my house is always wet. In the summer, it's extremely wet. I believe drainage is not being handled properly and needs to be addressed.
- Hail storms National pandemic
- Air quality can sometimes be very poor and effects the health of individuals in our household.
- Edgewater--most issues are weather related, bug infestations, trees and vegetation dying due to climate change. Also hail storms, always an issue here as well as high wind damage to homes, buildings, vehicles and weakening trees stressed from the hot dry temperatures.



- air quality; inadequate right of way design leading to unsafe conditions for vulnerable users and normalizing high risk behavior of drivers
- Pandemic and snow storms
- Flooding Lakewood/Golden
- The impact of increasingly severe wildfires and the sustained Colorado drought to the mountain communities of Jefferson County must be addressed now. Please incorporate wildfire, wildfire evacuation and availability of water threats into all proposed developments in the mountain communities at the Jeffco Planning & Zoning review process. These impacts must be included in all applications from the initial filing for any new development proposed.
- Living in Genesee with only one official way out of the community in the event of a disaster (I.e. fire).
- Various storms causing lengthy power outages
- Just generally aware of wildfires in Evergreen area, and limited evacuation routes.
- The drought, expansive soils and subsidence are all an issue for existing residents, and especially new and future residents in the Rooney Valley. Building on land that is suitable for a clay mine is not forward thinking.
- Extreme wind and hail storms have damaged my property in the past five years. I deal with wind issues more than hail, but it's always on my mind. I also live across the street from the Vietnamese Baptist Church field in Edgewater which used to be a lily pond, so I worry a lot about subsidence and flooding!
- Pandemic, hailstorms, floods, global warming effects
- No. Not really sure what you could do about natural processes except those aggravated by humans, and even those will be a challenge to reverse.
- Wildfire mitigation in the Greater Evergreen area
- Pertaining to wildfires-if we had a serious wildfire in my area, especially if it started within a more suburban area, people don't have nearly the infrastructure to escape the fire. Might as well ride my bike out of Evergreen if a fire started downtown/near my house.
- Mud slide/flood in our back / drought this past year and presumably next year
- wildfire - Evergreen
- I'm concerned about continued development in Evergreen and it's effect on water, fire mitigation and limited exit access on existing roads in an emergency (particularly fire).
- Reconsider how the so-called 100 year flood is determined. Develop equitable drought plans.
- Wildfires
- Wildfires in Evergreen. Escape routes, 74 to 285 or 70.
- None. We cannot control the weather.
- Forest fires are my greatest fear in the mountain areas of Jefferson County.
- We need to take action for the future and climate change. We have Nrel in our backyard, wonder if we could do some partnership
- Hail and wind events
- Central area, I worry (though I don't live there) about Leena Gulch through the mobile home park that is in Golden. Golden has a role, but the upstream issues are the counties. And the culvert under Colfax may be undersized. Given severe rain events I would like to see the county do more purchases and demolition (over time in an equitable way) get rid of housing in FEMA flood plains.
- So much growth is happening but parking, ingress/egress routes are not being properly addressed.
- Wildfire_ Evergreen and Conifer
- Evergreen-wildfires, drought, hail, windstorms
- Wildfire/EFRD. Flood/County
- Jeffco Drought, fire and poor development practices by planing and Zoning adding to these drought and fire problems
- wildfire around Evergreen and Bergen Park.



- Wildfires and not being able to get out of town because of overcrowding.
- Genesee - extreme wildfire risk and inadequate roadway infrastructure to support an efficient evacuation Concern about the CodeRED system used to alert residents -- too many failures No established system to get up-to-date information on an on-going emergency
- Wildfire mitigation
- My biggest concern is evacuation notification, routes, up-to-the-minute communication, in the case of firestorm, such as the one that burned so many homes in Colorado Springs a few years ago.
- Flooding and erosion from New houses being built on the mountain behind the house at 6826 s brook forest road in Sprucedale park.
- Wildfires on all of our surrounding mountains
- People without independant transportation. As folks without cars during evacuation
- Evergreen specific: concerning high density new construction that may cause traffic problems and evacuation difficulties
- Wildfires pose a threat to many areas in Jefferson County. I see that as a firefighter in Golden.
- In regards to the above answer, the hazard would be wind or snow. Power outages due these causes are a problem, particularly with so many working from home. In the older neighborhoods the old style, above ground power lines are vulnerable to disruption. It is not enough to have buried lines in the newer developments, but older neighborhoods need to be upgraded with more secure and less easily disrupted underground power lines.
- Hail, wind
- Wildfires
- Hailstorms, wildfires, Covid-19 have all directly impacted my life in Lakewood and Golden. I would also like to recommend that the planning committee specifically call out and address Climate Change as a large threat to our community with the potential to amplify nearly all the natural disasters listed.
- Deadfall and trees cut down for construction but never cleaned up.
- exiting the community / neighborhood if there were a fire. North Evergreen ~ not many routes to exit.
- I work in JEFFCO, but I don't live there. I am not sure i can answer this question well enough to help the committee.
- With the high winds this week we've definitely been wondering if extreme windstorms will become more frequent with climate change, if large temperature swings become more common. This seems worth planning ahead for with respect to new builds, at least.
- Climate change needs to be incorporated into this plan, as it will significantly impact environmental hazards over the next 5 years and beyond in Jefferson County.
- I didn't see Climate Change as an option to check in the previous screen.
- Rat infestation from garbage and trash
- The other major hazard we have at this time is the threat of white supremacy and white supremacists. I'm curious to know what Jeffco is doing about this ever expansive threat and how to address it within law enforcement, local government, and organizations associated with Jeffco.
- Schwartzwalder Mine. It's in Jeffco but outside Arvada city limits (obv).
- 86th Parkway and Kipling flooding during heavy rain fall. Arvada/Westminster/Jeffco
- Single Family House Fires and having resources for those impacted, surge capacity for mutual aid requests from other counties within the Denver/metro area, increased homeless in Jefferson County, civil disturbance and economic recovery from COVID. I live in Arvada but these hazards can be applied to any area within Jefferson County.
- Coal creek canyon, golden gate canyon. Both areas of Jeffco
- The flood zone from Ralston reservoir



- Please consider flood mitigation measures in hopes that we can be removed from the FEMA 100year flood plain designation eventually. The insurance is extremely expensive and can make building and updating too difficult.
- Soil radiation levels from Rocky Flats is all. I know these are higher in Colorado regardless. Just testing and awareness is all.
- Bad hail storm in 2017. I think it is smart to consider the impact on government property caused by hail, and possibly assistance for those in need due to any natural hazard.
- Flooding, Arvada
- Hailstorm in 2017 with significant damage to property.
- Extreme weather (winds, lightning, rain, snow, heat) causing damage to property and life due to poorly maintained properties (private and public) in the areas of structures, landscape, and undeveloped/abandoned sites.
- You didn't include the electric grid going down. This is a potential threat that could seriously disrupt life as we know it.
- Drought and city planning as well as development (grass and plants in the city that need to be watered). Would like to see drought tolerate plants used. Reduce trees or at least use drought tolerant trees. Consider fake grass instead. Huge cost to have sod.
- Are homes with contents and yards full of debris a concern for fire and health hazard? Address 2090 Kendall St Edgewater specifically
- Hail storm
- Fire is a real issue and concern. Don't believe/residents really under the need for mitigation and what steps should be taken to prevent possible destructive fires. Severe hail storms are an issue but not sure what can be done to prepare for those. Been through the 2012 or 13 severe rain which caused lots of damage. Would like to know more about up keep of drainage ditches
- not sure what you are asking here
- Wildfire Escape routes from Genesee
- Genesee: I am most concerned about wildfire. I have no specific concern, but I feel it is the number one threat.
- Exiting Genesee in case of wildfire
- Hell, wind, lightning, and fire.
- Proper road drainage and runoff management. Many places in Genesee the County runoff ditches are highly eroded and subject to spilling out of their confines given a heavy rain. Please check culverts too. Road and Bridge does a good job overall, but this is an area that could use their attention.
- Cyber attack on energy sources and oninternet
- wildfire, pandemic response, climate change impacts (hail, floods, wind, fire)
- Kay Artus Those of us on the south side of Genesee have no egress in case of fire. We can jump in the Water Board pond, but we don't have a road for evacuation to Morrison Road.
- Hail storms and wild fires.
- No
- Need to really focus on wildfire and mitigation in the foothills and western suburbs.
- Wind for older trees. Hail storms. Arvada
- Wildfire
- JeffCo at exit 256. With a fire ban still in place and these winds, our fire danger will get worse, more quickly this summer. Educate, educate, educate!
- Emergency egress route for residents of Genesee, especially if a wildfire comes from the west and obstructs the only one way to get out to Route 70 or if Route 70 is blocked / closed.
- Do not allow big money privatization of our water rights for Colorado River/Big Thompson. Austrailia is very sorry they have done what we are considering doing. (I don't have the recent article handy but



mentioned farming water near Grand Junc or Alamosa somewhere being diverted (bought) to West Pueblo and they didn't honor revegitation requirements at all. good article.) If we can't do it right or safe, do NOT do it.

- Wildfire due to drought
- I would like them to consider fire mitigation issues within Jefferson County.
- Severe weather.
- Trees need trimming and drought concerns
- Mountain community - Concerns about evacuation routes and public notifications when there is a disaster. Need for more public education around hazards, what to expect from government, and preparedness actions that should be taken. For a high hazard area, I see no presence of community engagement for preparedness education.
- My biggest concern by far are wildfires especially those caused by humans. I am concerned about the ability to evacuate the Genesee neighborhood in a timely fashion.
- Wildfire in the foothills communities. Forest management/thinning to reduce hazards, information on evacuation protocols, designation of evacuation routes, safe zones, and shaeltering.
- Wildfires
- I have 10 years of experience with FEMA, and know first-hand that flooding is hands-down the most urgent hazard to address. The city has already done a good job of either keeping floodplains in their natural state or installing parks in those areas. Continuing in that vein and making improvements where necessary is a wise course of action. Another area to address is making sure the public knows where emergency shelters are located.
- Rock slides in the Idaho Springs area will happen...the best service would be training our highway patrol in traffic diversion and planned routing options. I worry that we think we can avert every disaster. We can't, but we can do a better job of directing during the response. Life has to go on and the job of public servants is information and options.
- Railroad disaster on the tracks that run through the county.
- Wildfire and hail
- Need professional drone operators to discover exactly where fires are in the foothills.
- Wildfire planning
- Limited escape routes/roads for evacuation in Genesee
- I am not very concerned about hazard issues at my home and neighborhood. The pandemic is by far the most significant thing I've experienced in the foothills of Jeffco in the past 20 years followed (by a large margin) by the 2003 blizzard.
- Fire mitigation, smog reduction
- Please address an alternate exit path for Genesee residents. Right now there is really only one point of exit for a vast majority of residents. Thanks!
- Would like more information on fire mitigation. Genesee
- City of Arvada has a hazard at Ralston Fields Urban Renewal that they can't mitigate. Can the county help Arvada Urban Renewal mitigate risk that has been sitting in the empty lot for over five years? All the city will tell us that there is a hazard and they can't go ahead with construction. Please help our neighborhood regain its beauty and safety. Thank You.
- mostly worried about fire danger
- Protect water sources
- Fire, Genesee
- Wildfire and slash removal without costs to homeowners.
- From hiking in the public lands in Jefferson County, I have observed that the forests are, overall, poorly managed and ripe for a serious wildfire that will be difficult to control.
- Ralston creek flooding, also runoff basins next to parks



- Flooding, water runoff from new developments, poor or no drainage improvements
- Wildfire is by far the worst hazard in the foothills part of Jeffco. It's crazy that there is no wildfire chief for the county.
- I live in the Evergreen area (since 2002) and I am concerned about the lack of forest management in the small scattered public forests areas (mostly National Forest lands) and road access. I have been evacuated for fires 3 times in the last several years. My home has lost power several times due to wind, fallen trees, and winter storms. I am prepared but I know many of my new neighbors needed a lot of help this last summer when evacuating for the Elephant Butte Fire.
- "Mountain Traffic- Speeding, Passing on Double Yellow. Sherriff Dept.
- Over dense delopment Planning and Zoning. Water Supply."
- Fire hazard due to "up to 700 people per day" at the proposed Bike Ranch.
- Wage pollution in Indian Hills due to excessive building permits without water resources
- Heavy snow storms and loss of power.
- Other than the COVID pandemic, disruptions have generally been minor for me. But wildfires and drought related conditions are a significant concern given what we have seen around the state.
- Indian Hills - water quality, water table, wildfire
- Drainage issues. Fire danger even though I have mitigated
- Indian Hills: drought
- Fire mitigate and rock slide mitigation
- Drought and fires, Indian Hills
- Water and fire mitigation my biggest concerns.
- Wildfire is number one: Indian Hills
- Forrest fires in our community.
- Water, drought, well vs city Indian hills availability.
- Hail and fire. Borders confusing--Golden Heights/Golden Hills, Jeffco Unincorporated, Pleasant View. Is IGA in place and reliable?
- The roads suck in snowstorms. I used to be able to drive rear wheel drive in the winter with good tires, now I have all wheel drive with excellent tires and it sucks. 285 in the 3 miles from C-470 up the S curves, but actually all over.
- Drought! I would love for there to be recommendations to really make a push to convert lawns to xeric.
- Dam failure
- Arvada: The lack of periodic maintenance and debris removal of Ralston Creek floodway channel, in general, but more specifically from Rensselaer Dr to Miller St significantly increases the flooding risk to homes in the floodplain, even from smaller storms.
- Fire
- Enforcing sidewalk clearing, winter walking is very dangerous. It is my only mode of transport so when the sidewalks don't get cleared it creates great hazards.
- Wilfire Risks to Evacuation Routes. How will Jefferson County's emergency management office evaluate and manage risks posed by high density housing developments in mountain communities? What is the published criteria which measures risk of over development which the public can rely upon? Who in Jefferson County is responsible for enforcement? How does JCSO interact with JeffCo P&Z to ensure all risk is mitigated. Larimer County Sheriff's Emergency Management, has responsibility to ensure no high density development occurs in the sloped regions of their county.
- Power failures
- Yes, the gullies either side of most roads in Genesee have caused significant damage to cars, and people who have no natural walkable or running border. They also cause erosion where the weirs get clogged.
- Wildfire



- The area between Baily and Conifer is an extreme wildland fire risk. There is much that should be done to mitigate wildland fires in this area by thinning and other forest health measures. We need to stop developing in areas that have been identified as high risk for wildland fires. Need to support the organizations and companies that plan for and implement wildland fire mitigation.
- Wildfires!!! - Unincorporated Jeffco - South Genesee
- Fire
- Smoke from wild fires, wild fire
- M80s and other large scale exploding fireworks dangerous to humans and animals SW of Quincy and Kipling; windstorms in the corridor south of I70, west of Kipling, east of C470, north of Ken Caryl.
- Comprehensive FIRE MITIGATION plan. Consideration of evacuation routes, water availability and stricter building codes with new construction for mountain Jeffco.
- Wildfire mitigation like we did with JCD. In JeffCo. Pleasant Park; Conifer area
- That snow storm in 2019 was a big one. Also, minor flooding a few times. Then drought and fire has us packed and ready to go all summer.
- Wildfire mitigation in the WUI. Jeffco, Golden/Genesee
- Pandemic - try not to dismiss it in the beginning all over Twitter, Council, and put off responding to it because you don't listen to science. Refusing to deal with it, weakened this city. City Council tweeting that it was a bunch of bunk and the City was not going to lock down, until the Governor stepped in, is irresponsible and the outcome of that negligence lays squarely on your shoulders.
- Fire Mitigation
- Wildfires, Hailstorms
- Improvement of egress routes, removal of hazard trees and vegetation
- Intersection of 100th and Simms. Curve in the road near north entrance to Standly Lake. Have been repeatedly told that Simms is a county road & actually Simms is where the traffic light needs to go. This has gotten worse and worse for 30-40 YEARS! It is a health hazard to everyone who uses it. Life & Death Hazard. The one stop sign doesn't work. Have to "dive" off eastbound 100th between moving cars onto northbound Simms.
- Invasive weed control on all public lands and help manage on private lands
- Wild Fire mitigation, Elk Creek Fire Dept
- Jeffco is big and potential hazards vary considerably throughout the county. In green mountain village, I am more concerned about subsidence and expansive soils than earthquakes. I worry about "the big one" with regards to forest fires in the west side of the county.
- Better plans for citizens to leave their properties when wildfires occur. This applies to the Evergreen and Conifer areas particularly. A lot of citizens only know one or two routes to flee their homes.
- the wind seems to have increased in the last 5 to 10 years... I have replaced a roof due to hail storms
- Hail, hail, the roof is shot... Every couple of years we get a doozy.
- Wildfire mitigation and urban interface
- Wildfire is the biggest hazard issue in the foothills. The number of people from outside the foothills mountain communities visiting for recreation is increasing. These individuals do not understand the dramatic hazard that can be caused by wildfires and do not seem as careful as foothills residents. We are finding more cigarette butts on the sides of the road during our daily walk than ever before!!!
- Keeping roads safe during snowfall and icy conditions
- Wildfire, county
- Wildfire in Jefferson County
- The preceding list of hazards is immorally limited to anthropocentric risks. Significant issues not listed on preceding page are impacts of human development on wildlife and the ensuing extinction risks. Additional issues include flooding such as the floods in Fort Collins in 2013, health issues from increasing high temperatures caused by green house gases, wildfire risks in western Jefferson County.



- wildfire
- COVID-19
- How hazards impact wildlife, air, & water quality, soil health, loss of trees/plants
- I'm, of course, excluding the current pandemic. Clearly, covid is disrupting everything on a daily basis.
- over-use of open space; specifically: Maxwell Falls, Three Sisters and Elk Meadow-All in Evergreen area
- We have had several wildfires next to C-470 and near the Quincy/Belleview/Hampden exits the last couple of years. Is there a way to make a wider barrier on the side of the road (C-470) and the foothill sides? Is it due to car mufflers, thrown out cigarettes? Also, the electrical grid at Quincy and C-470 could be particularly vulnerable due to wildfires.
- Relationship between new development and wildfire risk. Does new development increase the risk of wildfire?
- Wildfire Hazard
- Pandemic stupidity, general scientific ignorance on the part of hippies.
- I am concerned about our open space catching on fire. I would like to see mitigation take place at Bear Creek Lake Park, in particular.
- Wildfire - Genesee
- Educating people about the importance of fire mitigation and then providing help/support to do the mitigation. That might be having a homeowners property evaluated with recommendations and also Counties taking care of open spaces. After last summers fires around the west we need to make this a priority. Along with that education and information about evacuation plans.
- Wildfires - Evergreen area
- Wildfire
- Drought seems to be an increasing danger. Will there be water restrictions.
- "Unincorporated JeffCo: Wildfire Congestion due to limited escape routes"
- Wildfire
- Speeding cats
- Erosion in open space ravines around Green Mountain.
- Wildfire mitigation
- Fire
- Campfires being left burning on Evergreen trails. This is a huge issue especially in the summer when it's dry.
- Hail
- Evacuation routes and communication in case of nearby wildfires.
- Fire problems
- We need another exit out of Genesee in case of fire or other disasters.
- Hail, Covid
- Bad air quality from wildfires, loss of power from storms
- Some of us residence of Genesee only have one escape route in the event of a major forest fire...very concerned with this situation
- I understand that the hazards are not uniformly experienced over the breadth of the county. I participate in a volunteer group for our community that focuses on fire and safety issues. We are very active in planning for the upcoming CWPP for our fire district and the mitigation projects that will follow to implement recommendations from this evaluation. Further, we experienced significant financial impacts from the hail and windstorms in our area of the county. We also have spent funds on fixing erosion control problems caused by flooding from extreme storms. It will be important for the county to provide forward thinking to coordinating help/aid for communities that will continue to face these hazards.

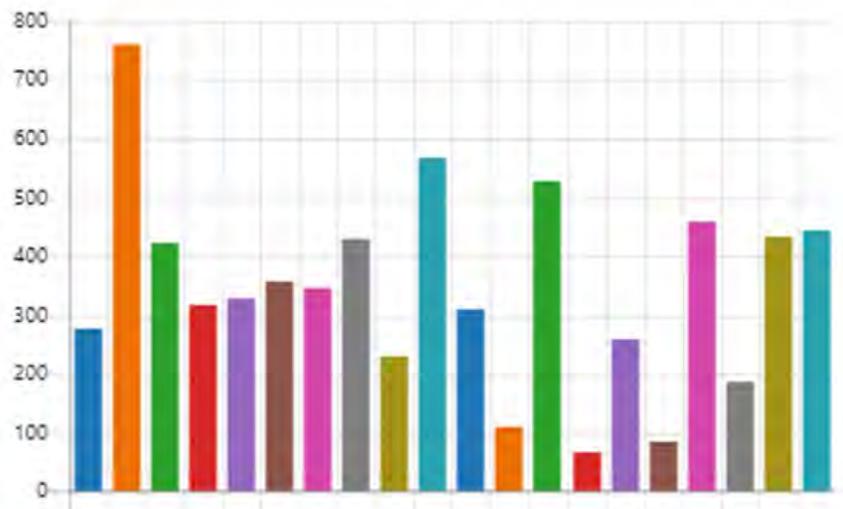


- We were evacuated due to a fire once and placed on full ready for evacuation due to another fire. This was the Evergreen/ Brook Forest area. Neighbors in our area burn fires during parties that last well after dark. There should be a ban on all open/out door fires due to the severe dry conditions we are experiencing with large fines for violators.
- "Drought. We live in mountain district 1, and have a well for all of our domestic water. Ensuring there is enough aquifer water to maintain our well is essential. Keeping housing density low helps to maintain our available water.
- Wildfire. Our risk of fire is very high. Keeping JeffCo on fire restrictions is important. People from other parts of Colorado visit our area and do not appreciate how high risk fire is. We keep a defensible zone around our house and store additional water for fire use if needed. "
- Wildfire and lack of mitigation in the foothills, especially in combination with the attempts of developers to develop high-density housing in the foothills - where there already exists a LACK of firefighting personnel and resources and mitigation community-wide.
- Wildfire mitigation in the Wildland Urban Interface Noxious weed control, especially cheatgrass as a fire hazard
- Wildfire. We back up to public lands, and irresponsible use concerns us.
- Wildfire, jeffco foothills
- Cynthia Baldwin. Jefferson County areas in Evergreen, some residents property along Snowshoe Rd, National Forest along Snowshoe Rd. Evergreen Mountain along Arapahoe Dr. All these area have dead fall. No cleanup done.
- I live on app. 10 acres of ponderosa forest near El Rancho, off I-70. I do what I can, and try to practice sustainable forestry, but I'm just one 70 y/o guy. There needs to be more assistance, resources, and public/private sharing programs to assist in thinning, fire breaks, and other mechanical wildfire risk reduction actions. The first steps in these programs should be free of charge to get buy in from landowners, with cost sharing thereafter. Thank you.
- Wind and hail hazard reduction. Building codes need to be updated for heavy hail and wind storms. Designate hail shelters for people to seek protection in the event of hail. Educate people about infections.
- Bear Creek Open Space, City of Lakewood. I keep warning them about the fire hazard of long-accumulated deadfall along the creek. They keep ignoring me.
- Evergreen. Wildfire mitigation---cutting roadside trees.
- Covid 19... big hail storm a few years ago
- Wildfire mitigation in the foothills
- Wildfire - foothills,
- Wild fires
- School safety
- Wildfire mitigation
- Wildfires and the associated air pollution in the Denver metro. Air pollution from ground level ozone from car exhaust.



Question 4: The following types of mitigation actions may be considered in Jefferson County. Please indicate the types of mitigation actions that you think should have the highest priority in the Jefferson County Hazard Mitigation Plan.

- Indoor/Outdoor Warning syst... 277
- Wildfire Fuels Treatment proje... 761
- Assistance with Defensible Sp... 423
- Continued Participation in the... 318
- Critical Facilities Protection 329
- Generators for Critical Facilities 356
- Planning/Zoning 346
- Public Education/Awareness 430
- Stormwater Drainage Improve... 228
- Forest Health/Watershed Prot... 569
- Stream Restoration 308
- Education and Discounts on Fl... 109
- Water Conservation 527
- Avalanche mitigation 67
- Landslide/Rockfall mitigation 257
- Floodprone Property Buyout 84
- Evacuation route development 459
- Dam safety 184
- Improve reliability of commun... 434
- Public Health incident prepare... 445





Question 5: Please comment on any other pre-disaster mitigation actions that the planning committee should consider for reducing future losses caused by disasters:

- Please improve the reliability of Code Red. Some people say they get notifications, others do not. Make a big push for residents to join it too.
- Advancing public education on mitigation actions for wildfire/risk assessment on private property
- The road to atheism is paved with bibles read cover to cover.
- Reducing activity at Maxwell Falls. It's just a fire disaster waiting to happen. Continue slash program and support of Elk Creek Fire and other agencies in chipping.
- Wildfire is my top concern.
- Potential damage to infrastructure by radicals.
- Organizing neighborhood response training and organizing to prepare for disasters
- Mapp the hazards and educate the public. Programs such as the fluvial hazard zone mapping are needed so the public can make educated decisions about where to live.
- Wildfire, flood, cyber attack mitigation is important
- Earthquake, Fire, Terror Event, preparedness supply caches, training and qualifications of first responders.
- Recommending no new developments in Conifer be denied until a comprehensive water and fire plan be made. We need to look at this problem at a community level, not a case by case basis when a development is proposed.
- Public announcement sent to our phones to alert us of impending dangers.
- Forest health and dead fall mitigation is critical. At present, it is in desperate need of attention.
- A massive wildfire is eminent. Especially concerned about Evergreen Mt and Three Sisters zone.
- Explosions and vandalism at oil & gas sites, chemical plants, large computer and data companies, biochem laboratories, and sites with large quantities of hazardous materials such as agricultural storage of fertilizer, breweries that may use large refrigeration systems, and hazardous waste storage and disposal facilities.
- watershed/reservoir security.
- I think education is key. One of the greatest hurdles to disaster preparedness and mitigation funding is that the people in the community often don't think disasters will happen or that they will affect them. The communities that are made up of educated and prepared individuals are more open to taking steps needed to prepare at the individual and community level.
- The Jefferson County Fairgrounds is currently at risk for being closed or repurposed. This is a vital community asset for use during crisis situations including housing for evacuated animals, camping areas for people, and as a venue for testing/vaccines for COVID-19.
- pipeline replacement and fire hydrant system expansion to improve wildfire fighting capabilities on Lookout Mountain
- Land use and building codes are such powerful tools!
- Evacuation of animals/livestock planning
- While I understand the NFIP flood insurance program is good for protecting current home/business owners I believe that more effort and funding should be made to remove buildings from flood prone areas and enhancing streams to handle higher flood flows caused by developments.
- Saving ponds for use during fires
- Livestock evacuations and transportation
- Maintain important public facilities that are used for disaster relief and evacuation of people and livestock
- No more building as the roads are already busy enough gregory stores are over run and can't seem to keep enough on the shelves and people don't have enough water to maintain thier homes let alone enough fire fighters to help with fires and water did mention not enough water.



- Do more stuff for animal owners and evacuations and get the word out better
- The Fairgrounds need to be available for emergency use!
- Evacuation of Conifer Mountain
- Wild fires are a real threat to life and property in the wooded area of the county
- It's a natural disasters that I don't think you can plan for everything.
- The county already requests input on geologic hazards from the Colorado Geological Survey. Their recommendations should continue to be followed. The Colorado State Forest Service and the Jefferson Conservation District provide guidelines for wildfire mitigation strategies, which are most easily applied to new development and HOAs. It is important to reach out to existing individual homeowners to inform them of programs and procedures that would help reduce the risk of wildfire in their areas.
- Our road is a dead end and high fire danger area. There is a way to put in an evacuation dirt road
- See previous free-form answer regarding citizen preparedness.
- Keeping the jefferson county fairgrounds as an evacuation center for animals and livestock
- Wildfire mitigation and evacuation. Education and electronic communication to the public on how to prepare for disasters and how to properly evacuate. This would be a great use for our fairgrounds. Being able to hold emergency preparedness training for the public there. Flood evacuation and home preservation.
- Clear evacuation route maps and access to fall out shelters for planning and training
- Find away to get homeowners to clear their property of dead trees in the foothills. Start with warnings, no dead trees within 50ft of structures, etc. Start small, can't expect someone to pay to clear 100 trees, but maybe 10 a year.
- Jeffco fairgrounds availability in case of fire for livestock
- Very concerned about losing the JeffCo fairgrounds as a place to evacuate large animals. It is centrally located and well-equipped for handling the on-slaughter of livestock evacuations that happen with every wildfire. We cannot lose this resource. Some people have to make multiple trips. If we are forced to drive farther out we won't be able to save all of our animals in an emergency.
- so many areas of the county do not have an outdoor warning system. can not rely on there always being cellular signals/internet to get alerts out
- development in the WUI is poorly managed
- I think you guys do a pretty decent job, but I'm in the city so I may not have the best perspective. 'm displeased that flood insurance isn't available to everyone. The point of insurance is to distribute risk so that no one carries too much risk. Eliminating "safe" people from participating concentrates risk for no good reason. I'd like to have flood insurance, but since flood maps don't show my home as vulnerable, I can't.
- Better Cell Service throughout mountain areas
- VERY concerned about wildfires and major wind storms.
- Add an optional signature line onto all Election Ballots to allows voters to opt out of the secret ballot right, and in to a more verifiable, trackable voting record, if they want to. Then we can individually choose write out our names and sign our actual paper ballots, in order to make them fully trackable back to us, and therefore genuinely auditable. That would be a relief.
- Protection of natural habitats/space through open space and parks without expanding use through increasing parking lots or adding amenities in those areas which ultimately cause more loss of natural space.
- Matching support for community non-profits that do and have done the type of work that Jeffco should be engaged with, especially with respect to flood recovery and mitigation and wildfire mitigation. Adoption of FEMA flood hazard maps is long overdue combined with the regulations to implement them. There have also been so many lost opportunities to buy out flood hazard properties since the 2013 floods, it is depressing. Maintenance of the Jeffco Fairgrounds is crucial for managing livestock



evacuations in the event of an emergency or disaster. Planning for communicating with and evacuating vulnerable adults is also crucial given the parlous nature of transportation options in rural parts of the county.

- I have lived in Jefferson County for 52 years and we as a community NEED an evacuation facility to house and care for large animals. I have been personally effected by wildfire and floods, Had it not been for the Jefferson County Fairgrounds evacuation center, so many people would have lost their loves, their animals. I personally believe our Fairgrounds an absolute necessity in our community. We also need proper fire and flood mitigation.
- climate change awareness and mitigation
- Fire mitigation work
- Better signage at parks-specifically Alderfer Three Sisters informing visitors of fire bans, no smoking etc and fines connected to violating. Protect through upholding zoning laws that limit risk from large commercial businesses/residences near parks.
- Code red seems to work very well.
- Fire fire fire fire fire fire etc
- Work with the amateur radio community and ARES groups to strengthen the comm plan. Communication is information. Information is key.
- Homes in Indian Hills need fire hydrants closer together. They are too spread out and too far apart.
- I'm worried about the reservoir near Lee and Jewell in Lakewood
- Free Slash disposal
- Fire mitigation help
- Build community resilience (economic and social) ahead of disasters in order to ensure there are networks of support and access to critical public services while enabling quicker economic recovery from disturbances.
- I have a question on "improving the reliability of communication systems". I do not know what the current system includes, i.e. how are people notified, how has it been working? and etc. Bottomline is if the system needs improving, check that one!
- Support FireWise USA community sites
- Forest management. This is a critical step in meditation to other concerns listed. But this Also includes animal welfare and safe reliable facilities for meeting and safe storage of animals/livestock during emergencies.
- Minimize infrastructure and development in the mountains. There is no room to expand road ways to support influx nor can the water table bear draw down.
- Wind damage prevention
- FIRE MITIGATION
- Active shooter drills
- Public education and notification for those who visit JeffCo mountain areas. The greatest risk and fear of those of us who own property in the foothills is the hazardous behavior of those who do not live here. Constantly we see fireworks and campfires from visitors during fire restrictions. Individuals do not respect private property, I am regularly chasing people off from our four tiny acres; they are damaging stream areas, lighting camp fires, and simply trespassing.
- continued updating of bridges and culverts and stream debris removal dead tree removal along roadsides clear cutting for the proposed Gross Dam Expansion is NOT wildfire mitigation-- judicious harvesting on public lands is.
- Must keep our fairgrounds
- More wildfire/defensible space information and trainings
- Neighborhood gathering sites in an emergency



- - Forest thinning is crucial and long overdue. - Resilient communications for first responders - ID and prep evac routes and shelters. Exercise the activation process. - Prepare for urban civil unrest and the spillovers into JeffCo. - Formulate a ""Basic Preparedness"" course/class and campaign for JeffCo residents emphasizing basic self-reliance and preparedness. -Work with local amateur radio groups to integrate their capabilities into a resilient comm system. - Accelerate re-forestation in wildfire burn areas. - Assess social outreach effort effectiveness and modify as needed.
- Keeping Jeffco Fairgrounds open and available.
- Keep the jeffco fairgrounds open
- Require homeowners to create defensible space. Maintain dams.
- Cybersecurity plan & outsourcing managed cybersecurity solutions (Use NexusTek, they're local...contact Sammer Khalaf, their Sr. Director of Marketing. skhalaf@nexustek.com).
- Create & publish a list of which roads will be plowed first in the event of heavy snow.
- fire mitigation
- Improve public building security. More fire mitigation on primary evacuation routes
- For communication it seems a well orchestrated methodical network of cell phones and social media, radio and television, combined with existing alert systems should reach people.
- As highlighted by the fires of 2020, I think many people would like to know where to evacuate their animals (both small house pets & large animals or livestock). We also want to know there is space to do so. I'm also in support of local govt making sure critical systems and power have additional redundancies in case of natural or human threat.
- Please consider a solar or nuclear generated electromagnetic pulse as a potential threat (if you haven't already).
- Jefferson County Nature Center has a great following. Fire mitigation education and volunteer clearing could be achieved through them.
- plan ahead on how to notify people living nearby downstream of an earthen dam if it breaks-- ex. people living downstream of the dam in Hine Lake Park that currently needs repairs
- Wildfire is the highest risk to the areas of the county west of the urban area.
- I think in South Evergreen the need for forest mitigation is the most important. I would appreciate more public talks or papers regarding private property forest mitigation so that the residents understand how important it is for our safety.
- Communications primarily through a Facebook page when wildfires or other disasters occur is not best for everyone, Just look at the posts on Next Door next emergency, and you can see the confusion on where to go for info and best updates. Jeffco site is most logical, but it refers to FB!
- Loans for individual homeowners to mitigate their forest lands. I have 35 acres of thickly wooded property which I've been working on thinning for the past 20 years. It would be great to just do it one summer and get it over with.
- The fairgrounds need to stay, it is used for so many natural disaster evacuations (i.e. fires, floods) it is also being used now for the pandemic.
- Improved Cyber security measures.
- Bring nature back into the city, especially in floodprone areas. A lot of places I used to fish as a kid that were shady with lots of trees have had the trees cut down. Between that and summers being hotter than they used to be there is no place to get away.
- Evacuation safety points (where do people and animals, including livestock, go?)
- Improvements to interagency coordination
- CodeRED failure -- must have new, reliable emergency notification system.
- Communication of potential/actual issues at a more location-specific level.



- Consider efforts that affect the greatest majority of residents regardless of the value of individual losses; i.e., many low-value losses are more important than one high-value loss even when the total of the lower losses is less than the one higher loss
- Ability to communicate to the public if power is out everywhere. ie terrorist attack etc.
- Should residents be informed to have emergency , non-perishable food and water supplies on hand to last for a designated time such as 2 weeks, one month? Maybe a list of needs for one person times number in household.
- I really appreciate the slash program, the clearing of the county parks and the firewood program out of that clearing. I would like to see the county do more community education on fire mitigation and providing support in defensible space around homes. We continue to have home fires in the Conifer, Pine and Evergreen corridors each year, and so far have been really lucky to not have any of these fires spread into our mountain side to badly in resent years. We should be taking advantage of the increased FEMA mitigation grants to continue to prevent our greatest mountain threat.
- Over crowding in areas, this doesn't appear to reviewed as an issue in planning for development. A lot of the older neighborhoods do not have multiple ways for evacuation, this is an issue when new development occurs in the older neighborhoods. The impacts are severe in regards to if there is a need for evacuation, policing, fire control, snow removal, etc. I think this should be reviewed and resolved with planning and zoning not just reviewed for \$\$\$\$
- Don't clear cut every forest.
- Adequate evacuation and housing for livestock with reasonable locations and access
- Mitigation of fire hazards; i.e., forested lands.
- Fire mitigation
- Maybe some more tree and brush mitigation in coal creek canyon to minimize fire issues.
- Water and fire
- Hail warning system
- Safer and wider roads for traffic, complete overhauled of the evergreen parkway around the lake and through downtown evergreen and all directions for evacuations
- Educating public on landslide insurance - many landowners in CO Springs lost their homes in mapped landslides when landslides reactivated. Some were unaware of both the presence of mapped landslides and the option to purchase landslide insurance. Educate the public about flood zones and dam failure inundation zones and warning systems so residents in those zones can be prepared for an evacuation if necessary.
- Since I live in the Conifer area, wildfire mitigation/defensible space instruction is my biggest concern. I contacted the forest service to designate which trees I needed to remove & that was very helpful. I don't know if many people are aware that this service is available at a very reasonable cost. Advertising this & perhaps subsidizing it so more people can take advantage of it, may be helpful. I understand it's a problem, aesthetically & financially, to have people cut down healthy trees - I know it was for me. I wish I had a solution for that.
- I am not aware of the statistics, but I would like to say that I hope equity for racial and economic justice is considered when planning highest priorities.
- Clearing beetle kill
- A few years back the tornado sirens went off (tornado was actually in Thornton, I think, but that's another story). It was not a practice. I was in my basement but had to go outside to hear the warning message which defeats safety measures. We tried to access radio/TV...there was nothing on. Not good if it had been a more serious event. Years before that the sirens went off while I was near Belmar Library, I ran inside...all windows there, no one had a clue, they didn't hear the warning. We need to do something better or different.
- Redundancy and resilience in planning



- The better trained, informed, and invested our community is in the prevention and response to disasters the greater resiliency exists. In my opinion, this should be primary goal to prevent future losses. Reactionary movements and preparations for them are a poor substitute for resilient citizens.
- Cheaper slash collection and burning
- As we are looking to cut expenses and in the process our fairgrounds; we (at Jefferson County) hosted many animals from the Summer and Fall fires in Northern Colorado. It was such an important element of the fire victims' recovery process. Could we consider preserving this community space resource?
- Stop allowing housing to be built within flood prone areas. Building up the grade just concentrates the flow in one place, causes backups upstream and increases danger downstream
- Internet / communication structure. If it goes out we are in big trouble. Need a major state of the art program and back up. Also electric gas and water safeguards.
- A lot of the residence areas in the foothills are too packed with trees. They need to be addressed
- For those living in the hills and dales of Jefferson County, there needs to be education and rewards for home owner's that successfully complete and maintain their property in fire prevention and restoration of the forest on their property.
- Publish and test public non internet radio frequencies that will be used for emergency communications
- Collaborate with multiple partners to mitigate risks
- Need to include recovery planning so that there are resources and processes factored in and available. You may be planning to address that at a later date but by having it part of the overall awareness up front, it will be less of a burden
- Wetland flood planes/catch basins and wildlife refuge areas could help with flood offset areas. Rockfall is always a major hazard across jeffco
- I wonder if there is some zoning or other restriction that could be implemented at the county level to restrict or discourage building residences in forested areas. It is quite common to see new subdivisions go in in the forested areas of the foothills, often on steeper slopes, where road cuts are needed and many trees are cut down. There is some irony to creating "defensible space" as people move into the forest for the trees, then cut them down to protect their homes. It seems that building in these areas creates that conflict.
- All disasters are exacerbated by climate change, so I support all activities to slow climate change and reduce the impacts of climate change. We need to immediately and consistently do everything we can to reduce release of carbon dioxide and other greenhouse gasses.
- Include accountability plans for local council members to work on behalf of the plans addressed in this cycle and improve public transparency on dollars spent and associated outcome on the plans.
- Forest thinning, dam repair
- Cub Creek along Brook Forest Road and Highway 73 needs to be dredged. It was filled up after the 2013 floods and never cleaned up. Only so much homeowners can do to dig it out
- Alternative public routes are extremely important for the 285 corridor especially considering multiple wildfires affecting both Conifer and Evergreen. Highway expansion is needed to support exit strategies. This affects both local residents and the influx of campers, recreational visitors during the height wildfire season.
- JCSO Emergency Management Office be required to assess high density development impact to evacuation routes and determine if approvals/denials be issued predicated upon defined metrics.
- Having lived off North Turkey Creek for over 30 years, I'm seeing a large influx of people from metro areas moving into this area. Based on questions I see on next-door neighborhood websites I can surmise that their ability to mow, trim and thin wooded area surrounding their homes is not within their capabilities. I think that a worth while idea to explore would be to have the Evergreen Fire Protection District put a list of what they would consider to be approved contractors with ball park hourly rates to perform fire mitigation on home owners property on the next-door neighborhood web pages. From



what I can tell most people can afford to pay someone to do the work as long they don't feel like they are being ripped off.

- Increased development of open lots- traffic, water and wildlife impact from development in foothills.
- The county should support districts and cities in getting their Community Wildfire Protection Plans updated
- Improved protection of Evergreen's evacuation plan, including route capacities, balancing of potential evacuation needs with capacities, prioritize road additions and limiting developments for areas with potential bottlenecks, protective measures for critical routes, signage and public education for evacuation plans. Regarding flood hazards, we must insist Jeffco Planning & Zoning change their flood control evaluation processes. Clearly, what they've done over the past 30 years and continuing today - Is completely ineffective!
- Evacuation planning
- continue with CWPP. Stop more development in south Evergreen as we have no water to spare.
- fire mitigation in conjunction with USFS for emergency response and access
- Not many people consider post-wildfire impacts of flood, debris flows and earth movement until it's too late; binding coverage for both include a waiting period.
- You need to reduce density in high wildfire areas since the roads are not adequate for the existing development and cannot handle more.
- We need to have the public land owners in unincorporated Jeffco buy in to help with taking care of their lands to help us protect private lands. We need to come up with some way to convince private land owners to take steps toward making their own lands safe for themselves and their neighbors. We need to stop unnecessary development projects that strain our natural resources like water.....
- The most appropriate action would be to coordinate with JeffCo Planning and Zoning to ensure that the high density planning that is employed in Lakewood and Arvada is not used in the mountain areas. In other words, the planning committee should recognize that mountain areas require different planning in terms of wildfire risk compared to "down the hill". Adoption of this philosophy with JeffCo Planning & Zoning should be prioritized to ensure that urban density projects are not pursued in the mountain towns, such as Evergreen, to maximize safety for residents in the event of a major wildfire.
- Am currently in a three year fire mitigation effort (thinning forest on property and around house. It's expensive and not coordinated with the neighbors. County plans and mitigation help would be good.
- communication is key- I am worried about my neighborhood because without a landline you are cut off, and I am afraid that many of the new people in our neighborhood don't realize that without a landline, if the power goes out, nothing else works- if there was an emergency I am not sure how they would know before it was too late
- Financial support for fuels reduction; CWPIP support (manpower, equipment, financial)
- Limits on development
- Jeffco needs spend resources for more county support to local fire departments for quickly growing wildfires. The county is composed of a extraordinary amount of wildland urban interface and the potential for loss of life and property is extremely high. Efforts to pre-plan and train for large scale wildland response, community evacuations and IMT support should be a high priority for the county.
- Hold developers more accountable legally (over the long term) in terms the impact of their plans on the safety of the communities in which they want to build; recognize that in the case of a catastrophic wildfire, there will be no way of containing it (East Troublesome Fire) and educating people on their own responsibility when this happens; pressure JeffCo P&Z as well as JeffCo Health Dept to look at development in the foothills (Mountain Groundwater Overlay District) very differently from development in the flat lands.
- Wildfire fuels treatment / thinning
- Deal with fire preparedness. Esp excess fuels & defensible space.



- Cyber security infrastructure
- EAPs and EOPs. Exercising different scenarios on a yearly or semi-yearly basis using tabletop or functional exercises
- Watershed improvements
- Jeffco must adopt the recommendations of the Jeffco Wildfire Risk Reduction task Force including initiating this year the wildfire mitigation of all evacuation routes out of the mountain communities. this mitigation of evacuation routes must be a continuing priority each year to increase the safety of evacuating mountain residents. Jeffco must complete this wildfire evacuation route mitigation before approving any new multi-family dwelling developments in the mountain counties.
- Community exercises for evacuation. Apparently they have been done in the past however, due to high turnover in the community, may be very helpful to all homeowners.
- more green infrastructure for stormwater attenuation
- congestion on our roads is also a potential disaster situation. Especially when thousands of homes are built with just one or two access points. This problem will be exponentially worse if the Rooney Valley and other sites along C-470 are built out as planned.
- Political unrest and possible consequences.
- Educate public about hazards associated with the living in the Wildland Urban Interface. Require tree thinning or removal near structures. Help to proscribe burns to avoid mega-fires like the East Troublesome. Promote or provide tax benefits for someone who takes initiative to defend their home from fire.
- Well, if climate change can't be reversed, nothing else is really going to matter.
- What about armed insurgents?
- I would like to see a fire mitigation for homeowners program. I would be willing to pay for it.
- We should expands to everything that everyone can do. Limit plastic bags, work with excel energy, water companies etc
- Don't allow more building where there are expansive soils, unless there is some way to mitigate the likely damage to these homes with tougher codes. How is allowing this any different than building in a known flood plain, which we no longer allow. And you can get Federal expansive soil insurance. So just anticipate the problems and don't allow it. We should have strict codes around fire mitigation as well. If we allow people to build in that forest urban interface, they should have to cut back a defensible perimeter. Like beach front property that gets rebuilt after storms, but no longer, we too need to think about whether we really want to allow growth in forests.
- Reliable Early Warning Evacuation Notification and PLANNING.
- Zoning for overcrowding in small residential mountain towns
- Look into an app that will allow people to download and get preparedness info and alerts
- Stop the reckless development and subdividing of mountain properties. Fire and drought are going to worsen exponentially
- Consider disaster insurance
- It would be helpful to have a database, regularly updated, that lists evacuation centers, hotels that accept pets, places to take horses, livestock, etc. during evacuations, potential evacuation routes and alternatives for different areas in Jeffco (especially considering all the roadwork being done), preparedness guidelines, recommendations for mitigation, etc. Essentially, a one stop shop and then community education on the resource.
- Wildfire is a major Jeffco concern. While lightning caused fires cannot be predicted, but there are places in the urban-wilderness boundary which are at risk. On such place is Lookout Mountain Road. It is only a matter of time that a fire starts on the Lookout Mountain Road and heads into Golden. Strong consideration needs to be given to closing this road in the night time hours. Residential access to the tip of Lookout is easily and just as quickly done via I-70. There are just too many people on Lookout



Mountain who participate in risky smoking, fireworks and discharging guns. Any of these could cause fires. While the sheriffs' department can be called out for any of these activities, the level of patrolling needed is unrealistic. The road is an attractive nuisance where nothing good happens up there after dark, putting many at risk for wildfire.

- fire mitigation
- Plan for emergency public vaccination campaigns
- Climate Change mitigation strategies - reducing greenhouse gas emissions to help prevent or reduce the severity of natural disasters.
- Reduce overcrowded residential areas/construction.
- Food insecurity.
- developing and zoning so not to explode the population where we have limited resources.
- We should be using the tools available through NOAA to plan ahead for future climate change impacts at the county level. We have a forecast for how things will change, like extreme heat days and drought. If we're not planning ahead for this, it's a serious vulnerability. See <https://www.noaa.gov/stories/climate-change-in-your-county-plan-with-new-tool>
- I'm surprised that mitigating climate change impacts isn't explicitly considered as an area of concern to address. One obvious mitigation action is to reduce greenhouse gas emissions to lower global warming which exacerbates the impacts of natural disasters. The planning committee should consider what the county can do to address climate change, as it relates to the concerns listed in this survey.
- Educating the public on what and how to react is primary. Preparation is key to survival.
- The Board of County Commissioners recently passed a resolution declaring the climate change crisis a critical priority to address. The County will be preparing it's first Climate Action Plan this year. Because climate impacts have direct impacts on several disasters in the county, including disease and wildfires, it makes sense to consider climate change as a hazard to mitigate within the mitigation plan. The Hazard Mitigation Plan strategies should also overlap with the goals and targets expected to be a part of the Climate Action Plan.
- If there is a power outage due to a storm, have an understanding with Excel Energy about what the city can expect for time lines for repairs.. The degree of damage will dictate the impact, but have a good working relation with Excel can't hurt.
- As indicated previously, protecting the city's water supply is a big deal. Not many people are aware of the mitigation efforts at Schwartzwalder, and the continuing tensions between the state and private companies who are the responsible partners re: mitigation. Schwartzwalder (once the largest uranium mine in Colorado) is directly upstream from city reservoirs and should be watched closely.
- Tree trimming and removal to reduce windstorm downing of communications and power.
- Need to enforce watering rules on City and county property. many times during heavy rain the watering systems still run.
- Infrastructure development, surge capacity for mutual aid requests (having disaster survivors come to Jefferson County from other counties/areas)
- I believe that fire mitigation should be high on the list. I live in unincorporated Jefferson County and have a fire hazard right next door due to lack of cleaning up debris on their property.
- Xcel Energy Community Resiliency Initiative (will provide battery backup power for Arvada Center as a shelter/command center) -- pursue this option for other facilities. County government needs to address climate change and mitigate climate impacts. Climate change is at the root of weather and wildfire hazards.
- Pandemic preparedness
- Enforcement of laws and regulations regarding property (structures and land) maintenance and hazard removal. Provide severe penalties for failure to obey laws and regulations which may or will lead to further or extended damage.



- Develop a county-wide emergency plan for various scenarios, utilizing a representative from each agency involved in the response. In the past, the state of Colorado developed such a plan, although I'm not aware if it still exists.
- Wildfire fuels mitigation, reducing water use-mandatory H2O conservation in summer, reducing fertilizers/pesticide use for watershed health would all be a good start.
- I think you have covered the major issues/concerns
- clarify who has jurisdiction on mitigation--ARC or Fire dept.
- Definitely need emergency evacuation routes from the Genesee community. There are only two ways out at present.
- Genesee needs an emergency only exit on its southern end.
- Back up generator availability for neighborhood areas
- wildfire mitigation, evacuation routes, insurance and planning for critical (facilities, health)
- Really look close at evacuations, routes and warnings systems.
- Fire awareness and grants for fire mitigation.
- Wildfire mitigation and emergency exit routes for evacuation from Genesee
- In lieu of recent events, scrubbing employees who are in violent groups/activities/websites and can threaten us from within as domestic terrorists. Better vetting and do not hire criteria.
- I would like to know how Jefferson County works with bordering counties in all mitigation efforts (i.e., evacuation from Jefferson through other counties).
- mitigation education coming from local government; community leader engagement for buy-in, suggestions, to help share consistent preparedness messages, citizen engagement on mitigation implementation committee body
- harden critical facilities against cyber be sure ALL first responders are able to communicate with clear command/control, single channel that works between agencies like: FBI, State Patrol, City and County Police/Sheriff, ATF
- Planning and preparation are key to resilience so each must be prepared for disaster. It is also necessary to define the people most at risk and the people who can be trained to respond when professionals may be overwhelmed.
- Plans for vaccine distribution if that's included as pre-disaster mitigation. not just for covid but future strains of contagious illness
- Please coordinate with neighboring county's and the state to implement a complete solution to any situation.
- In serious need of a formal evacuation route plan
- Consider providing a free-service where homeowners can have someone come to their property, evaluate the wildfire risk to their home and make site-specific recommendations on how best to lower the risk for that property.
- When I asked my fire department what was the plan for fighting wildfire in my neighborhood, they said they didn't have one. They said it was because there were too many variables. Wrong. I've already found meadows where they could make a stand against a wildfire. What else would an expert find?
- fire mitigation around their homes and how they may exit properties in their area
- Continue offering local slash accumulation days, promote defensible space education and outreach, and public awareness campaigns.
- Water supplies for fires
- Improve warning systems
- Protection from fire. Needs a workable plan NOW
- Limit the population density
- Preparedness for Forrest fires.
- Wildfire is the biggest threat. Evac and notifications plans need to updated/communicated better.



- Local Shelters? Especially for humans made homeless and for animals.
- Fire mitigation for homes in the area and open spaces. Also, evacuation routes from the area.
- Incentivize water conservation, promote domestic recycling facilities
- County trails that have a lot of cross cutting contributing to excessive erosion. Example: Golden Summit trail-several years ago volunteers built stone walls along the trail to stop cross cutting. Then open space came in to grade the trail causing the stone walls to fail.
- Forest management! Sure, it will not stop a Cal-Wood fire situation, but can still do so much good.
- I am chair of the City of Golden's Citizens Sustainability Advisory Board. We have on our agenda for 2021 addressing a goal established by our City Council in 2019 "To develop a resiliency plan by 2020 to prepare for a time where Golden's and Colorado's climate may be substantially warmer and drier than it is today." Please feel free to reach out to me directly, or to Sustainability Director Theresa Worsham if there is an opportunity to collaborate in our efforts. My contact info: Ken Jacobs, jacobssri1@gmail.com; (303) 263-1170.
- Cyber security
- Highest priority is preventing loss of life. Protecting emergency evacuation routes from gridlock seems to be a practical inexpensive solution. Emergency Management should be first in line to evaluate the risks posed by High Density Development in the Mountain Communities.
- More aircraft fire tanker fighting equipment
- Fire egress to 74
- Stop building in high risk wildland fire areas.
- No
- Assistance for seniors
- Stricter building codes.
- High priority. Planning and zoning needs to restrict applications for high density housing and understand limits of water and serious fire danger in mountain areas. Limit 1 house per buildable acre. Roadways and access are different than city!
- Impacts to watersheds. Downstream treatment plants are trying to prepare, but having a plan to rapidly stabilize the burnt slopes will be beneficial.
- Cyber security education for the general public.
- I don't know of a specific public communication protocol?
- Forest management, fire mitigation, evacuation plans and planning for forest fire fighting.
- Open space brush removal, fire prevention.
- Help with home owners with wild fire mitigation.
- How about letting citizens know what would occur if a dam breaks, such as the Arvada or Standley Lake dams? For example, could my home flood if the Standley Lake dam fails? I am in local law enforcement and am not sure what could be affected if Arvada calls for assistance in this event?
- where I live it will always be...fire fire fire
- An evacuation route would be important. I25 & I70 would both be clogged in a serious event...
- There is no path to go on road from Genesee exit to Evergreen exit when I70 is closed or blocked. Potential life threatening condition to persons in area needing medical care. This has to be one of few places in USA where there are not alternate routes around the interstate.
- Improve notification systems and public awareness of them: Code Red, Reverse 911, community outreach.
- I am unaware of any evacuation routes for the city of Arvada. Creation and/or communication of those routes would be helpful.
- Evacuation Management - we live in Spring Ranch (Chief Hosa exit off I70) and there is only one way out unless we cut the chains that prohibit driving into Genesee Mountain Park. There needs to be plans and communication for areas that can only evacuate using I70



- There need to be planning and zoning best practices adopted for Jefferson county foothills communities and mountain areas. Boulder and Douglas counties have these types of best practices to avoid certain types of development that increase wildfire danger or further reduce environmentally sensitive areas. Additionally, water resources are impacted adversely by commercial activity. Commercial development on things like mountain meadows or in common residential areas does not make sense. Keep commercial development close to other such areas and near thoroughfares like Hiway 285.
- Public education is imperative.
- Stop development in the wild-urban interface. Promote conservation of threatened and endangered species. Either support reduction of greenhouse gas emissions or price carbon production out of business.
- Mapping the tree canopy, mapping and cataloging wildlife, protecting forest and water health via planning and conservation. Mapping impervious surfaces and speed flow of water, reducing through policy and conservation the amount of impervious surfaces to address flooding.
- Thoughtful planning for any new development should be considered with impact to our wildlife and wildfire evacuation routes.
- For wildfire County should address existing problems around existing development. More thoughtful consideration of evacuation routes and timing. For Pandemic, County should work to assure Statewide and Nationwide structure is available and County has resources in place to comply with State/Fed strategies. Promote and educate around water conservation strategies.
- Defensible Space and Wildfire Mitigation and Water Conservation should be key
- Public education on 5G safety.
- None
- Please stop cutting down so many of our trees.
- I think your lists cover most of the concerns. The biggest is wildfires and how to reduce the damage and effects of these fires. Education, mitigation, evacuation, planning are on your lists.
- Evacuation routes are critical
- Include good land stewardship practices (invasive species prevention and management, soil health, appropriate vegetation in landscaping (i.e. low water needs, natives, native pollinator habitat)
- Communication to residents when a disaster occurs.
- Wild fires maintain Forrest from burning by thinning and mitigation.
- Coordination programs with neighborhoods to ensure communication and education that is more effective and aimed at the area of the county most impacted by a particular hazard. Planning meetings across multi-agency representations with neighborhood reps to meet each other and understand the different areas of responsibilities.
- Anything they can do to reduce the the risk of fires even if more taxation for that purpose is required. Make the public more aware of this danger and more enforcement. Local T.V. news shows should be constantly alerting the public about this problem as should local papers. More signs to alert vacationers to the area of fire danger. More vigilance by police and forest rangers.
- Do not allow high-density development of any kind in the foothills communities!
- Adopt/enforce more stringent building codes that require new construction to be firewise so homes are less likely to catch fire.
- What about man made and man led threats to our community?
- Water conservation and fire fuel mitigation are critical.
- Food security (and other necessities) during major catastrophes.
- Wind and hail hazard reduction. Building codes need to be updated for heavy hail and wind storms. All buildings/homes should have hail proof roofs. Designate hail shelters for people to seek protection in the event of hail. Educate people about infections.

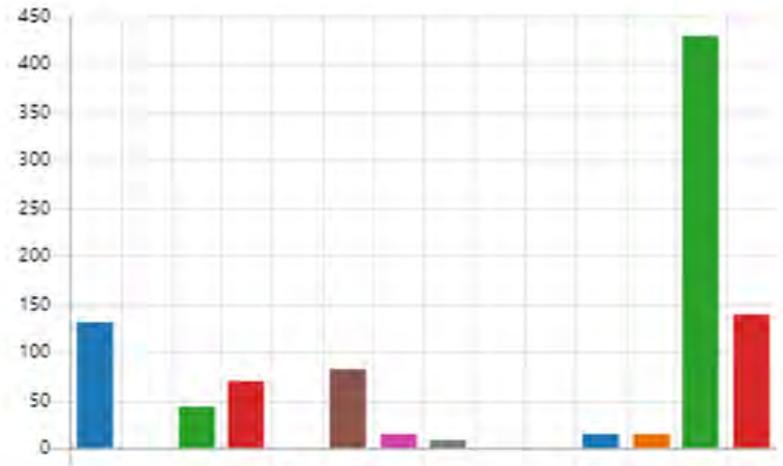


- Educate, educate, educate!
- Keep us informed of THE FACTS!
- Wildfire and drought have together become a big issue and it can turn into a flood hazard down the road due to less infiltration into the soil.



Question 6: Please indicate the community you live in

City of Arvada	131
Town of Bow Mar	0
City of Edgewater	43
City of Golden	70
Town of Lakeside	1
City of Lakewood	81
City of Littleton	14
Town of Morrison	9
Town of Mountain View	0
Town of Superior	0
City of Westminster	14
City of Wheat Ridge	14
Unincorporated Jefferson Cou...	430
Other	140



Question 7: How long have you lived in this community?

Less than 1 year	38
1-5 years	173
5-10 years	145
Over 10 years	590



Question 8: Optional: Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to this planning process: 360 Responses.



Appendix E : Mitigation Alternatives

DMA Requirements §201.6(c)(3)(iii):

[The mitigation strategy section 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 buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

As part of the process of developing the mitigation action plans found in Section 5, the HMPC reviewed and considered a comprehensive range of mitigation options before selecting the actions identified for implementation. This section summarizes the full range of mitigation measures evaluated and considered by the HMPC, including a review of the categories of mitigation measures outlined in the 2017 CRS Coordinator's Manual, a discussion of current local implementation and CRS credits earned for those measures, and a list of the specific mitigation projects considered and recommended for implementation.

Mitigation alternatives identified for implementation by the HMPC were evaluated and prioritized using the criteria discussed in Section 5.3.1 of this plan.

Once it was determined which flood hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of mitigation categories from the 2017 CRS Coordinator's Manual.

1. Prevention
2. Property Protection
3. Natural Resource Protection
4. Structural Projects
5. Emergency Services
6. Public Information and Outreach

E.1 Preventative and Regulatory Measures

Preventative measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include:

- Building codes
- Zoning ordinance
- Comprehensive or land use plan
- Open space preservation
- Floodplain regulations
- Subdivision regulations
- Stormwater management regulations

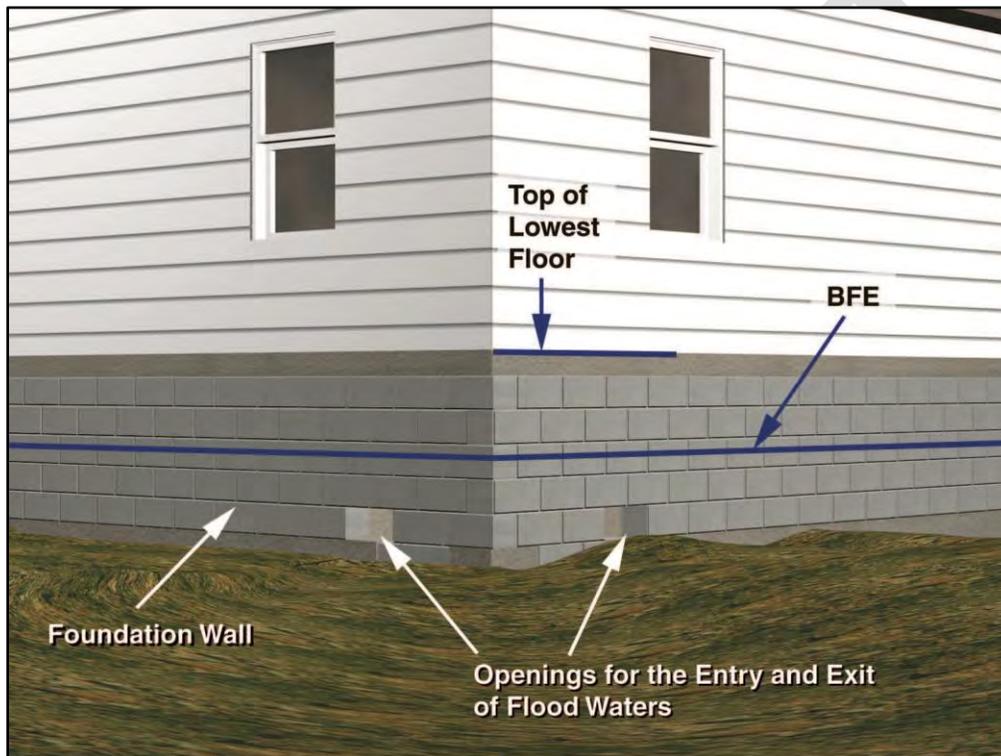
E.1.1 Building Codes

Building codes provide one of the best methods for addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the

impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure E-1.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.

Figure E-1 Building Codes and Flood Elevations



Source: FEMA Publication: Above the Flood: Elevating Your Floodprone House, 2000

ASCE 24 is a referenced standard in the International Building Code. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24. Freeboard is required as a function of the nature of occupancy and the flood zone. Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE.

E.1.2 Comprehensive or Land Use Plan

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open space or recreation.



E.1.3 Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced, or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes.

E.1.4 Zoning Ordinance

Zoning enables a community to designate what uses are acceptable on a given parcel. Zoning can ensure compatibility of land use with the land's level of suitability for development. Planning and zoning activities can also provide benefits by allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach. Zoning regulations describe what type of land use and specific activities are permitted in each district, and how to regulate how buildings, signs, parking, and other construction may be placed on a lot. Zoning regulations also provide procedures for rezoning and other planning applications. The zoning map and zoning regulations provide properties with certain rights to development.

E.1.5 Floodplain Regulations

A Flood Damage Prevention Ordinance sets development standards for Special Flood Hazard Areas (SFHAs). Communities participating in the National Flood Insurance Program (NFIP) are required to adopt a flood damage prevention ordinance that meets at least the minimum standards of the NFIP; however, a community can incorporate higher standards for increased protection. For example, communities can adopt higher regulatory freeboard requirements, cumulative substantial damage definitions, fill restrictions, and other standards.

Another important consideration in floodplain regulations is the protection of natural and beneficial functions and the preservation of natural barriers such as vegetation. Vegetation along a stream bank is extremely beneficial for the health of the stream. Trees and other plants have an extensive root system that strengthen stream banks and help prevent erosion. Vegetation that has sprouted up near streams should remain undisturbed unless removing it will significantly reduce a threat of flooding or further destruction of the stream channel.

E.1.6 Stormwater Management Regulations

Stormwater runoff is increased when natural ground cover is replaced by urban development. Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality. There are three ways to prevent flooding problems caused by stormwater runoff:

1. Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties.
2. Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions; and



3. Set construction standards so buildings are protected from shallow water.

E.1.7 Reducing Future Flood Losses

Zoning and comprehensive planning can work together to reduce future flood losses by directing development away from hazard prone areas. Creating or maintaining open space is the primary way to reduce future flood losses.

Planning for open space must also be supplemented with development regulations to ensure that stormwater runoff is managed, and that development is protected from flooding. Enforcement of the flood damage prevention ordinance and the flood protection elevation requirement provides an extra level of protection for buildings constructed in the planning area.

Stormwater management and the requirement that post-development runoff cannot exceed pre-development conditions is one way to prevent future flood losses. Retention and detention requirements also help to reduce future flood losses.

E.1.8 CRS Credit

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and points are awarded for adopting the International Code series. The State of Colorado does not mandate the adoption of building codes by local jurisdictions; however, Jefferson County and its participating jurisdictions have adopted building codes as detailed in Section 5 of the Base Plan and in the various jurisdictional annexes.

CRS credits are available for regulations that encourage developers to preserve floodplains or other hazardous areas away from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Communities can receive credit for Activity 430 – Higher Regulatory Standards and for Activity 420 – Open Space Preservation for preserving parcels within the SFHA as open space. Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. The credits in the 2017 manual have doubled for OSP (Open Space Preservation). The participating Communities can also receive credit for Activity 450 – Stormwater Management for enforcing regulations for stormwater management and soil and erosion control. Several prevention actions considered by the HMPC are detailed below.

Table E.1 – Prevention Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by HMPC and Not Recommended			
-	Continue enforcement of state building codes and more stringent local building requirements	The County has established this as an ongoing policy and does not need to commit additional resources through this plan update process to complete this activity. Mandating building codes for municipalities is not politically feasible.	n/a
Prevention Measures and Funding Recommended for Implementation			
Jefferson County 3	Weaver Creek major drainageway master plan and FHAD. The Weaver Creek Drainageway has many areas in which the existing channel and culverts lack the capacity to safely convey the major flood	Benefits include reduction in flood losses	\$250,000-Mile High Flood District, \$150,000, County



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
	events. A Master Plan is needed to properly plan and budget for needed improvements. The current Flood Hazard Area Delineation was prepared over 35 years ago and needs to be updated to accurately reflect the regulatory 100-year floodplain.		\$93,000, City of Lakewood \$7,000
Jefferson County 12	National Flood Insurance Program (NFIP) and Community Rating System (CRS) participation. This project provides for the continual participation in both the NFIP and CRS floodplain management programs, which enables properties within the county to get flood insurance at reduced rates. In addition, the floodplain management regulations reduce the flood risks for new and reconstructed buildings within the county.	Benefits include reducing flood losses for new construction within the county and allow older properties access to flood insurance to help protect existing buildings.	Within current county budget. Programs are funded from the county's general fund.
Jefferson County 24	Modernize existing FEMA Zone A floodplains that are outside the MHFD utilizing Lidar. There are approximately 2000 acres of FEMA Zone A floodplains outside of the MHFD that have limited accuracy. The effective boundaries were based on 10–40-foot contours that have a significant margin of error. Utilizing the available Lidar, the boundaries could be remapped with a higher level of confidence.	Accurate maps benefit property owners, first responders, County staff and FEMA staff.	\$100,000 - \$1,000,000 HMA grants
Jefferson County 25	Update FEMA Zone AE floodplains that are outside of the MHFD. Update the studies associated with the FEMA Zone AE floodplains that are outside of the MHFD and mainly in the mountain areas of the County. The FEMA Zone AE floodplains include approximately 700 acres. The effective data is based on studies that are generally 30+ years old and have varying degrees of accuracy.	Accurate mapping in areas that have had increased development in that time period which would benefit the citizen, County staff and FEMA staff.	\$100,000 - \$1,000,000 HMA grants
Jefferson County 26	Update the South Fork of Deer Creek floodplain. The South Fork of Deer Creek is partially within the MHFD and is classified as a flood prone area.	Completing a study will better define the floodplain risk associated with this segment.	\$10,000 - \$100,000 grants & MHFD
Jefferson County 17	Discovery of a community-wide slash collection center. Community wide slash collection site aimed to provide slash removal opportunities to a larger more inclusive community wide audience.	Removing debris in streams and rivers will help to prevent worse flooding events	\$100,000 - \$1,000,000 Program use fee and local authority
Arvada 1	Leyden Creek Improvements. The 2013 flood inundated homes and private property along Leyden Creek. A drainage master plan has since been completed to identify strategies and drainage improvements to reduce the risk from future floods.	Benefits include reduction in flood losses	\$12,000,000 Jefferson County, MHFD, Farmers Reservoir and Irrigation Company, and Arvada
Arvada 2	MHFD Master Plan Implementation. In the early 1970s a drainage master plan was generated that identified drainage needs in the city not along the major creeks. Over the years numerous projects have been completed. This project would entail updating	Benefits include reduction in flood losses	\$20,000,000 MHFD and City of Arvada



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
	the Master Plan and continuing with implementing the master plan improvements.		
Arvada 5	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program.	The city also participates in the Community Rating System and is a CRS Class 5. This project restates the commitment of the City of Arvada to implement sound floodplain management practices, as stated in the floodplain ordinance.	Low Covered in existing budget
Edgewater 1	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The City of Edgewater participates in the National Flood Insurance Program. This project restates the commitment of City of Edgewater to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations. This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date.	Reduced property loss from floods, continued availability of flood insurance for residents.	Low Covered in existing budget
Golden 2	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The City of Golden participates in the National Flood Insurance Program. The City also participates in the Community Rating System and is a CRS Class 7 (up from 9 in 2010).	This project restates the commitment of the City of Golden to implement sound floodplain management practices, as stated in the flood damage prevention ordinance.	Low Covered in existing budget
Golden 3	Floodplain Mitigation Plan. The City of Golden needs to develop a floodplain mitigation plan for identified floodplains within the city, in particular along Clear Creek that flows through the city with identified structures and people in the hazard plain.	Reduced damages from flooding.	Less than \$10,000 Dept Budget
Lakewood 1	Expand the existing Flood Hazard Inventory Tool (FHIT) for Lakewood Gulch, Weir Gulch, Sanderson Gulch, Sloan's Lake Basin, Dry Gulch, Bear Creek Tributaries and small portions of drainages south of Bear Creek. The Flood Risk Assessment Tool would be used as a decision / planning tool to identify areas of risk in proportion to flood events and to develop flood mitigation and response actions.	The flood assessment tool will include 10, 100 and 500 year flood events and will identify structures and their relative degree of flood risk. Additionally, the assessment tool will also provide 100/500 –year digital flood insurance rate maps, dam break inundation zone topography, satellite images and a Flood Alert Monitoring Network. A FHIT will provide Lakewood with the ability to predict on a timely basis the impacts of severe flooding events.	\$10,000 - \$100,000 Grants, Department Funding, Mile High Flood District
Lakewood 2	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The City of Lakewood participates in the National Flood Insurance Program. The City also participates in the	This project restates the City of Lakewood's commitment to implement sound floodplain management practices, as stated in the flood damage prevention ordinance.	Low Covered in existing budget



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
	Community Rating System and is a CRS Class 6.		
Lakewood 3	Flood impact assessment tool and prediction system. Develop an operational web-based system that would be able to predict potential flooding impacts across the City and provide notifications to emergency response personnel. The tool would identify specific areas of concern (including homes, businesses, roadways, critical facilities, and others) based on identified threat thresholds using a GIS interface.	This early warning would provide for both life safety and reduction in property losses due to flood damage.	\$10,000 - \$100,000 Grants and Department Funding
Wheat Ridge 1	Clear Creek floodplain mapping and master plan. Revise the floodplain maps for Clear Creek to reflect a 30% reduction in the regulatory flows that was approved by FEMA in Jan 2017.	The revised maps will more accurately depict the actual flood risk for properties along Clear Creek resulting in many properties that were added to the floodplain in 2014 being removed.	\$100,000 from Wheat Ridge 2015; IGA with MHFD
Wheat Ridge 2	Sloan's Lake floodplain mapping and master plan. Revise the floodplain maps for the Sloan's Lake basin to reflect the updated FHAD that was completed in 2019.	The revised maps will more accurately depict the actual flood risk for properties.	\$17,000 from Wheat Ridge; 2016 IGA with MHFD.
Wheat Ridge 4	Improve Wheat Ridge CRS rating to a Class 4. Wheat Ridge is currently a Class 5 CRS community with residents in the floodplain receiving a 25% discount on their flood insurance premiums. Improving to a Class 4 would result in a 30% savings.	The additional program elements in order to raise the rating results in the community being more aware, better prepared, and more resilient from flooding.	Ongoing operation. City General Fund
Wheat Ridge 9	Lena Gulch floodplain mapping and master plan. Revise the floodplain maps for Lena Gulch to reflect updated flows.	The revised maps will more accurately depict the actual flood risk for properties along Lena Gulch.	\$30,000 from Wheat Ridge; 2021 IGA with MHFD.
Morrison 2	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The Town of Morrison participates in the National Flood Insurance Program and the Community Rating System.	The Town implements sound floodplain management practices, as stated in the flood damage prevention ordinance.	Low Covered in existing budget

E.2 Property Protection Measures

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building;
- Modify the building (retrofit) so it can withstand the impacts of the hazard; and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

E.2.1 Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the



hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

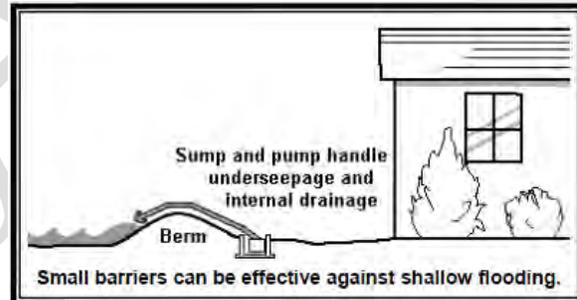
There are five common methods to keep a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of the flooding.
- Move the building out of the flood-prone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

The latter three approaches are the most effective types to consider for the planning area.

E.2.2 Barriers

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier. Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained.



E.2.3 Relocation

Moving a building out of a flood prone area to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

E.2.4 Building Elevation

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.



E.2.5 Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move – such as larger, slab foundation or masonry structures – and for dilapidated structures that are not cost-beneficial to protect.



E.2.6 Pilot Reconstruction

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

E.2.7 Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

- **Dry Floodproofing:** Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques. Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.
- **Wet Floodproofing:** The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

E.2.8 Insurance

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, so long as the policy is in force, without requiring human intervention for the measure to work.



- **Private Property:** Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.
- **Public Property:** Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

E.2.9 Local Implementation/CRS Credit

The CRS provides the most credit points for acquisition and relocation under Activity 520, because this measure permanently removes insurable buildings from the floodplain. Communities can receive credit for Activity 520 – Acquisition and Relocation, for acquiring and relocating buildings from the SFHA. The HMPC recommended that communities pursue the purchase of repetitive loss buildings and other buildings which are subject to flood damage in order to return this land to open space.

The CRS also credits barriers and elevating existing buildings under Activity 530. The credit for Activity 530 is based on the combination of flood protection techniques used and the level of flood protection provided. Points are calculated for each protected building. Bonus points are provided for the protection of repetitive loss buildings and critical facilities. Communities can receive credit for Activity 360 – Flood Protection Assistance by providing advice and assistance to homeowners who may want to flood proof their home or business. Advice is provided both on property protection techniques and on financial assistance programs to help fund mitigation.

Flood insurance information for each community is provided in Section 5 and in greater detail in each community's annex. There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that, among other topics, explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage. Communities can receive credit for Activity 330 – Outreach Projects. Property protection mitigation options considered by the HMPC are described below.

Table E.2 Property Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Property Protection Measures Considered by HMPC and Not Recommended			
-	Look for opportunities to mitigate repetitive loss structures	No specific projects have yet been identified, and there is no funding available at this time.	n/a
Property Protection Measures and Funding Recommended for Implementation			



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Jefferson County 27	Purchase properties from the SFHA to reduce flood losses. Within the MHFD, utilize the MHFD Property Acquisition Reserve (or similar) to acquire properties within the Floodplain Overlay District. Outside of the MHFD, apply for funding to purchase properties within the SFHA.	Reduce property damage, injuries and loss of life due to flood risk.	More than \$1,000,000 grants, MHFD, CIP
Arvada 11	Ralston Creek Improvements - Vance Street to Wadsworth By-Pass. The purpose of this project is to remove approximately twenty residential properties in the 100-year floodway along Ralston Creek from just upstream of Vance Street to Wadsworth By-Pass. A detailed solution has not been identified, but it will probably be a combination of channels improvements and purchasing food prone properties.	Reduce property damage, injuries and loss of life due to flood risk.	More than \$10,000,000 MHFD, City of Arvada, Hazard Mitigation Assistance Grants
Wheat Ridge 3	Stormwater CIP - Wadsworth and 35th drainage improvements. As a part of the Wadsworth Widening project, the 1950 storm sewer will be replaced with a larger capacity system that includes a water quality pond before discharging into Clear Creek.	Reduce property damage, injuries and loss of life due to flood risk.	\$8 million from Wheat Ridge, \$63 million widening project. 2015 IGA with CDOT
Morrison 1	Relocation of Town Shops. Morrison town shops are located adjacent to Bear Creek in a flood zone. Equipment necessary for flood recovery is stored in these shops.	Relocation to safer location would protect equipment from damage/loss due to flash flooding. Benefits include building and equipment costs.	\$50,000 plus site acquisition and development costs Town general fund, Jefferson County Open Space
Morrison 8	New Municipal Building. Morrison's Town Hall and Police Department are currently situated in the historic downtown area, and is within 1% Annual Chance floodplain, less than 500' from a regulatory floodway. This location has presented challenges for the Town and critical first responder services and equipment are not readily accessible in all conditions. The need for relocation has been identified as a priority by the Town's governing body, in order to maintain the Town's continuity of government during periods of flooding and other catastrophic events. In times of flooding, services to residents can be interrupted should the building become inundated or inaccessible.	The relocation of the Town's fundamental operations to a new building will not only provide a safe place for day to day operations for Town staff and equipment, but can act as an emergency/evacuation shelter in times of catastrophic flooding.	\$10 million; Town's General Fund

E.3 Natural Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and stormwater in pervious areas
- Infiltration that absorbs overland flood flow



- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. This section covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Six areas were reviewed:

- Wetland protection
- Erosion and sedimentation control
- Stream/River restoration
- Best management practices
- Dumping regulations
- Farmland protection

E.3.1 Wetland Protection

Wetlands are often found in floodplains and topographically depressed areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.



E.3.2 Erosion and Sedimentation Control

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil. Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices.

E.3.3 Stream/River Restoration

There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or



rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

Communities are required by state and federal regulations to monitor storm water drainage outfalls and control storm water runoff.

E.3.4 Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

E.3.5 Dumping Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how re-grading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement



program should include public information materials that explain the reasons for the rules as well as the penalties.

E.3.6 Farmland Protection

Farmland protection is an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land.

E.3.7 Local Implementation/CRS Credit

There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. Communities can receive credit for Activity 420 – Open Space Preservation for preserving a portion of the SFHA as open space.

Additionally, credit is available for Activity 540 – Drainage System Maintenance. Having a portion of the drainage system inspected regularly throughout the year and maintenance performed as needed would earn a community credit. Communities can also get credit under this activity for providing a listing of problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program.

Table E.3 Natural Resource Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Natural Resource Protection Measures Considered by HMPC and Not Recommended			
-	Additional wetlands restoration projects.	Insufficient details were identified to make this an implementable project.	n/a
Natural Resource Protection Measures and Funding Recommended for Implementation			
Jefferson County 19	Habitat restoration. Stronger ecosystems are more resilient to catastrophic event such as flooding, fire, and erosion	Restoring our land is essential to preserve natural aesthetics, restore wildlife habitat, and improve water quality.	Unknown Department Budget and Grants
Jefferson County 28	Bear Creek bank stabilization. The bank along Bear Creek downstream of the Evergreen Lake dam, requires stabilization to reduce flood risk, sediment transport and deposition. There are outfalls that along this segment that increase sediment loading to Bear Creek.	Will reduce the flood risk in the historic commercial area of Evergreen, improved fisheries and reduction of the sediment load in Bear Creek.	\$100,000 - \$1,000,000 grants



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Arvada 12	City Wide Vegetation Management Program. The purpose of this program would be to proactively manage overgrown vegetation and dying trees along open channel drainageways within the City. This effort would restore the channel's roughness coefficients to a comparable value modeled in the Flood Insurance Studies. Additionally, this work would be complemented with tree mitigation efforts at strategic locations throughout the City.	Restoring our land to preserve natural aesthetics, restore wildlife habitat, and improve water quality. Will reduce the flood risk.	More than \$1,000,000 UDFCD, City of Arvada, Hazard Mitigation Assistance Grants
Denver Water 4	Watershed Program: Sediment Management Plan. Denver Water is developing a sustainable watershed sediment management plan to explore partnerships and identify projects that reduce sediment transport to Strontia Springs Reservoir. The focus area for projects in Jefferson County will be the watersheds draining to the South Platte upstream of Strontia Springs Reservoir and below Cheesman Reservoir, including all watersheds within the North Fork of the South Platte.	Will benefit forest health, and sediment issues dealing with dam storage and water quality	\$220,000; Denver Water budget.

E.4 Emergency Services Measures

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

E.4.1 Threat Recognition

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.



E.4.2 Warning

The next step in emergency response following threat recognition is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- CodeRED countywide mass telephone emergency communication system
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.

E.4.3 StormReady

The National Weather Service (NWS) established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather-related warnings for the public. To be officially StormReady, a community must:



- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Being designated an NWS StormReady community is a good measure of a community's emergency warning program for weather hazards.

E.4.4 Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with



actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Holding children at school or releasing children from school (school superintendent)
- Opening evacuation shelters (the American Red Cross)
- Monitoring water levels (public works)
- Establishing security and other protection measures (police)

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

E.4.5 Evacuation and Shelter

There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., disabled persons, prisoners, hospital patients, schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

E.4.6 Local Implementation /CRS Credit

Flash flood warnings are issued by National Weather Service Offices, which have the local and county warning responsibility. Flood warnings are forecasts of coming floods, are distributed to the public by the NOAA Weather Radio, commercial radio and television, and through local emergency agencies. The warning message tells the expected degree of flooding, the affected river, when and where flooding will begin, and the expected maximum river level at specific forecast points during flood crest.

Communities can receive credit for Activity 610 – Flood Warning Program for maintaining a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. Community Rating System credits are based on the number and types of warning media that can reach the



community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits for additional measures, like telephone trees. Being designated as a StormReady community also provides additional credits.

Table E.4 Emergency Services Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Emergency Services Measures Considered by HMPC and Not Recommended			
-	Increased emergency response capabilities.	Identified as response and preparedness, not mitigation activities.	n/a
Emergency Services Measures and Funding Recommended for Implementation			
Jefferson County 4	Notification polygons for dam failure and flash flooding. Develop pre-established notification polygons or equivalent for citizens who reside in dam failure hazard areas. Can also be established for floodplains. The technology currently exists in the CodeRED system employed by all county 911 entities. The project will require taking the dam inundation maps and floodplain maps for the targeted areas and creating a polygon in the CodeRED system.	Faster notification will give citizens more time to evacuate from flood-prone areas which could prevent injury or death from flooding.	Minimal, need in-kind labor In-kind
Jefferson County 13	Storm Ready program participation.	Being a Certified Storm Ready Office will help to serve residents and County Offices better. An added benefit to this is, once a Community is certified as Storm Ready the Insurance Services Organization can provide Community Rating System points which may be applied to lower National Flood Insurance Program (NFIP) flood insurance rates.	None or \$5,000, if it is necessary to upgrade equipment, training, staff hours, OT hours, and/or host trainings. EMPG

E.5 Structural Projects

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting citizens' homes and businesses.
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

- Advantages
 - They may provide the greatest amount of protection for land area used
 - Because of land limitations, they may be the only practical solution in some circumstances
 - They can incorporate other benefits into structural project design, such as water supply and recreational uses



- Regional detention may be more cost-efficient and effective than requiring numerous small detention basins
- Disadvantages
 - They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat
 - They require regular maintenance
 - They are built to a certain flood protection level that can be exceeded by larger floods
 - They can create a false sense of security
 - They promote more intensive land use and development in the floodplain

E.5.1 Levees and Floodwalls

Probably the best-known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

E.5.2 Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.



Retention pond

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

E.5.3 Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

E.5.4 Local Implementation /CRS Credit

Structural flood control projects that provide at least 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS so as not to duplicate the larger premium reduction provided by removing properties from the mapped floodplain. Other flood control projects can be accepted by offering a 25-year flood protection.



Table E.5 Structural Projects Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures Considered by HMPC and Not Recommended			
-	Incorporate flood risk velocity and depth criteria into floodplain regulations.	Would need to be presented to the BOCC to change current evaluation criteria.	n/a
Structural Project Measures and Funding Recommended for Implementation			
Jefferson County 1	Major drainageway culvert improvements with Mile High Flood District. Multiple locations of roadway crossings with significantly undersized culverts to be replaced with culverts to accommodate the 100-year flood flows.	Reduced flood losses safety for emergency vehicles and the public during major flood events.	\$9,000,000; MHFD
Jefferson County 2	Minor culvert improvements. Multiple locations of roadways with existing culvert crossings either failing or in eminent danger of failure.	Reduced flood losses and provide for public safety.	\$1,000,000 per year County General Fund
Jefferson County 30	Drainage and Flood Control Improvement for Weaver Creek at Belleview Avenue. Replace three existing corrugated metal culvert crossings of Weaver Creek along Belleview. The existing structures were identified in the 2018 master plan as overtopping during the 10-year flood. New structures will be designed to pass the 1% chance flood.	The increased capacity of the three structures will allow for emergency services and residents to use Belleview Avenue during a flood event.	More than \$1,000,000 50/50 match of all project costs between Jefferson County and Mile High Flood District
Jefferson County 31	Drainage and Flood Control Improvement for Dutch Creek at Yukon Street. The existing corrugated metal culvert overtops by 2 feet during the 10-year flood and 3 feet during the 100-year event. This amount of overtopping makes the road impassible for emergency vehicles and local traffic during storm events.	The new culvert will pass the 100-year flood to allow for vehicle access.	More than \$1,000,000 50/50 split of project cost between Jefferson County and Mile High Flood District
Jefferson County 32	Drainage and Flood Improvements for Leyden Creek at Croke Canal. During the 2013 floods in Colorado Leyden Creek overtopped its banks and excess spill flooded Croke Canal. This additional flow flooded homes and properties downstream of Indiana St. The proposed project would create a low flow channel for Leyden Creek under Indiana St and Croke Canal. A spillway would be installed at Croke Canal to prevent flows from entering the canal.	Protect homes and properties from flooding from Leyden Creek and Croke Canal.	More than \$1,000,000 Cost share between Jefferson County, City of Arvada, and Mile High Flood District.
Arvada 13	Ralston Creek at Ward Rd. The purpose of this project is to replace the Ward Road bridge and increase channel capacity. This project was identified in the Ralston Creek US Army Corp Study of 2018 as part of the preferred alternative.	Reduce the floodplain footprint resulting in fewer structures within the regulatory floodplain. Additionally, the improvement would help protect critical water distribution pipes in the area.	More than \$1,500,000 MHFD, City of Arvada, Hazard Mitigation Assistance Grants
Edgewater 2	Coordinate Management with the Mile High Flood District on the Storm Water Drainage Detention Basins. The City of Edgewater has, over the past 20 years, mitigated flooding by a drainage project that includes holding areas for water and a	Reduced property loss from floods.	Low Covered in existing budget



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
	drainage canal. This is part of a larger project run by the Urban Drainage and Flood Control District.		
Edgewater 3	25th Ave. Storm Water Undergrounding. As part of converting part of 25th to a one-way, the city is planning to underground stormwater.	Reduced property loss from floods.	Medium Redevelopment Funds
Golden 1	Heritage Road culvert improvements. This project would involve replacement of undersized, failing culvert under Heritage Rd that was built in the 1940s. The new culvert will be designed to pass the 100-year flood under the road, reducing the potential for property and road damage, and keeping access to City Fire Station open at all times. Second phase planned for Lena Gulch to channelize and contain the 1% flood.	Reduced flooding of property and structures, road damage including access to City Fire Station.	\$2M appropriated to date for 2nd phase
Golden 4	Kenny Run, Daylighting and channel improvements. Project entails extending the open daylighting efforts for Kenny Run upstream of 14th Street to extend initially to 16th Street.	Result in a significant reduction in floodplain extents from 16th Street downstream to Clear Creek, removing several buildings in the Golden East Downtown area.	Estimated \$5-7M for the second phase extension of the open channel
Lakewood 4	North Dry Gulch Improvements – Dover Street to Lamar Street. Prior to the Lakewood’s incorporation in 1969, development occurred along West Colfax Avenue and did not preserve most of the North Dry Gulch natural drainage channel. The existing drainage systems are inadequate for larger storms resulting in flooding of streets and private properties. This project will replace the inadequate storm sewer system with a large underground conduit and storm sewer laterals capable of conveying the 100-year storm event.	Reduced property loss from floods.	More than \$1,000,000 Department budget, Mile High Flood District, other
Wheat Ridge 5	Floodplain Projects – Clear Creek and Lena Gulch. After the master plans are completed for Clear Creek and Lena Gulch, implement identified projects to reduce flooding and/or maintenance.	Reduced property loss from floods.	\$1.5 million for Lena Gulch and \$3 million for Clear Creek; City General Fund & MHFD

E.6 Public Information

E.6.1 Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.



Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

E.6.2 Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about floods for children.

E.6.3 Technical Assistance

Hazard Information

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Explain when building permits are needed for home improvements.



E.6.4 Public Information Program

A Program for Public Information (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- The local flood hazard
- The property protection measures appropriate for the flood hazard
- Flood safety measures appropriate for the local situation
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- Goals for the community's public information program
- The outreach projects that will be done each year to reach the goals
- The process that will be followed to monitor and evaluate the projects

E.6.5 Local Implementation /CRS Credit

Communities can receive credit under Activity 330 – Outreach Projects as well as Activity 350 – Flood Protection Information. Credit is available for targeted and general outreach projects. Credit is also provided for making publications relating to floodplain management available in the reference section of the local library.

Table E.6 Public Information and Outreach Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Public Information and Outreach Measures Considered by HMPC and Not Recommended			
-	Debris control specific public education program	HMPC determined this can fit within the flood education and outreach action.	n/a
Public Information and Outreach Measures and Funding Recommended for Implementation			
Jefferson County 9	Flood education and outreach. Increase the flood awareness of residents of Jefferson County to protect people and property. This project would build upon annual floodplain notification efforts associated with the County's CRS program participation. Efforts include distributing the MHFD flood awareness brochure to residents in the floodplain.	Increased awareness of the risk and dangers of flooding can reduce the impact of flooding to the citizens of Jefferson County.	TBD
Arvada 6	Hazard and Risk Mitigation Public Education and Awareness. City staff to reach out to residents and businesses about emergency preparedness and possible mitigation activities through awareness campaigns, events, public outreach, website, social media, and workshops.	Increased awareness of the risk can reduce the impact of flooding to the citizens.	Covered in existing budget Covered in existing budget
Arvada 15	Flood Hazard Public Outreach. The City will implement public information and education projects to increase the community's awareness of flood hazards and safety.	Increased awareness of the risk can reduce the impact of flooding to the citizens.	Less than \$10,000 Department budget, FEMA Hazard Mitigation Assistance Grants
Lakewood 7	Strengthen and expand community social networks to increase hazard awareness, preparedness, foster collaboration,	Promote the formation of social resiliency circles where residents come together to increase	Less than \$10,000



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
	<p>communication and cooperation. Support existing neighborhood programs that increase social capital and enhance neighborhood identity, including Lakewood Linked, annual neighborhood organization registrations, the Neighborhood Participation Program, and the Sustainable Neighborhoods Program in order to reduce social isolation as a vulnerability in the event of a disaster. Conduct outreach, training, and awareness campaigns on hazards and climate impacts in the City. Continue to use Lakewood Linked to strengthen relationships between neighborhood residents, businesses, the faith community, and schools. Utilize the successful Eiber Resiliency Circle as a model to support the formation of similar groups.</p>	<p>personal security through learning, mutual aid, social action, and community support.</p>	<p>Department budgets</p>

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APPENDIX F: REFERENCES

Beaufort Wind Scale. National Oceanographic and Atmospheric Association, <http://www.spc.noaa.gov/faq/tornado/beaufort.html>

City of Arvada. www.arvada.org

City of Arvada Public Works Department, September 11-13, 2013 Arvada Flood Event Reconstruction and Documentation, Final Report, March 2014.

City of Edgewater. www.edgewaterco.com

City of Golden. www.ci.golden.co.us

City of Lakewood. www.ci.lakewood.co.us

City of Wheat Ridge. www.ci.wheatridge.co.us

Coal and Clay Mine Hazard Study and Estimated Unmined Coal Resources, Jefferson County, Colorado by Amuedo and Ivey, 1978. http://inside.mines.edu/fs_home/tboyd/Coal/activity.html

Colorado Avalanche Information Center. <http://avalanche.state.co.us>

Colorado Department of Labor and Employment. <http://lmigateway.coworkforce.com>

Colorado Department of Local Affairs. www.dola.colorado.gov

Colorado Division of Homeland Security and Emergency Management. <https://dhsem.colorado.gov/>

Colorado Department of Natural Resources – Dam Safety Division. <https://dwr.colorado.gov/services/dam-safety>

Colorado Division of Reclamation, Mining, and Safety. <https://drms.colorado.gov/>

Colorado Drought Mitigation and Response Plan (2002). <http://cwc.state.co.us/NR/rdonlyres/E7B41604-5766-4FDD-B7B2-3F0A09A86606/0/ColoradoDroughtResponsePlan.pdf>

Colorado Earthquake Hazards – Colorado Earthquake Mitigation Council 2008. http://www.dola.state.co.us/dem/public_information/earthquake.htm

Colorado Geological Survey. <http://geosurvey.state.co.us>

Colorado Geological Survey Earthquake Report. http://www.dola.state.co.us/dem/mitigation/plan_2007/Earthquake%20Evaluation%20Report.pdf

Colorado Geological Survey Department of Natural Resources, A Guide to Swelling Soils for Colorado Homebuyers and Homeowners. (Denver, Colorado.) 1997. p 15-16.

Colorado Geology Photojournals http://www.cliffshade.com/colorado/dakota_hogback/

Colorado Health Information Dataset. www.cdphe.state.co.us/cohid
Colorado Landslide Hazard Mitigation Plan (2002). [http://dola.colorado.gov/dem/mitigation/plan_2007/2002 Landslide Update.pdf](http://dola.colorado.gov/dem/mitigation/plan_2007/2002%20Landslide%20Update.pdf)



Colorado Levee Report (2009).

Colorado Enhanced State Hazard Mitigation Plan (2018).
<https://mars.colorado.gov/mitigation/enhanced-state-hazard-mitigation-plan-e-shmp>

Colorado Parks and Wildlife. <https://cpw.state.co.us/>

Colorado State Demography Office. <https://demography.dola.colorado.gov/>

Colorado State Forest Service – Community Wildfire Protection Plans
<https://csfs.colostate.edu/wildfire-mitigation/community-wildfire-protection-plans/>

Colorado State Forest Service – Colorado Forest Atlas.
<https://csfs.colostate.edu/wildfire-mitigation/colorado-forest-atlas/>

Colorado State Forest Service. <http://forestry.state.co.us>

Colorado Sun, “After a small Colorado city paid cyber attackers a ransom, there’s concern about the rest of the state,” Aug 10, 2020. <https://coloradosun.com/2020/08/10/cyber-attack-ransomware-small-towns-data-breach-malware-lafayette/>

Colorado Water Conservation Board. <http://cwcb.state.co.us>

Community Rating System. www.fema.gov/business/nfip/crs.shtm

Cyber & Infrastructure Security Agency. <https://www.cisa.gov/>

Denver Regional Council on Governments. www.drcog.org

Denver Regional Council on Governments Natural Hazard Mitigation Plan.
www.drcog.org/index.cfm?page=NaturalHazardMitigation89

Directory of Colorado State Register Properties. www.coloradohistory-oahp.org/programareas/register/1503/

Drake, Brian, Estimating Increased Erosion and Sediment Delivery Caused by Wildfires.
http://www.cwr.utexas.edu/gis/gishydro06/Introduction/TermProjects/FinalReport_Drake.htm

Drought and Water Supply Assessment (2004).
<http://cwcb.state.co.us/Conservation/RelatedInformation/Publications/ColoradoDroughtWaterSupplyAssessmentDWSA/CWCBDroughtWaterSupplyAssessment.htm>

Enhanced Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center,
www.spc.noaa.gov/faq/tornado/ef-scale.html

Evergreen Fire Protection District. [udfcd.org/downloads/pdf/publications/fhad_new/Clear Creek FHAD Denver and Jeffco 2007.pdf](http://udfcd.org/downloads/pdf/publications/fhad_new/ClearCreekFHADDenverandJeffco2007.pdf)

Exploring Watershed Sustainability. <http://www.clearcreekwater.org/pdfs/CCWF-2007-report-optimized.pdf>

Federal Bureau of Investigation, 2019 Internet Crime Report. ic3.gov

Federal Emergency Management Agency. www.fema.gov



FEMA Multi-Hazard Identification and Risk Assessment (1997).
www.fema.gov/library/viewRecord.do?id=2214

Flood Hazard Area Delineation (Lena Gulch).
http://www.udfcd.org/downloads/pdf/publications/fhad_new/Lena%20Gulch%20Lower%20FHAD%202007.pdf

Flood Hazard Area Delineation (Lakewood Gulch).
http://www.udfcd.org/downloads/pdf/publications/fhad_new/Lakewood%20Gulch%20FHAD%201979.pdf

Fox News Online Photo Gallery. www.kdvr.com

Front Range Pine Beetle Working Group. <http://www.frontrangepinebeetle.org/>

Front Range Watershed Protection Data Refinement Workgroup Executive Summary. www.jwassociates.org/Projects/Front_Range/Front_Range.html

Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center,
www.spc.noaa.gov/faq/tornado/f-scale.html

Genesee Foundation MPB Action Plan.
http://www.geneseefoundation.org/geneseeEco/pdf/5_26_09%20Provisional_MPB%20Plan.pdf

Guide to Construction and Administration of Dams in Colorado,
<http://water.state.co.us/damsafety/damguide.pdf>.

GSA Field Guide 1 Colorado and Adjacent Areas (1999).

"Hayman Fire Impacts" handout produced by the Wildland Fire Lessons Learned Center.
http://www.wildfirelessons.net/documents/Hayman_Fire_Impacts_FMT_Vol65_1.pdf

Headwaters Economics, Economic Profile System, <https://headwaterseconomics.org/apps/economic-profile-system/>

Henson, Robert: "The Thinking Person's Guide to Climate Change".

Indian Hills Fire Protection District. www.indianhillsfirerescue.org

Insurance Service Office, Inc. <http://www.iso.com/>

Intergovernmental Panel on Climate Change – Climate Change and Land Report.
<https://www.ipcc.ch/site/assets/uploads/2019/11/SRCCL-Full-Report-Compiled-191128.pdf>

Jefferson County. www.co.jefferson.co.us

Jefferson County Archives and Records. <https://www.jeffco.us/1974/History>

Jefferson County Assessor's Office. <http://jeffco.us/assessor/index.htm>

Jefferson County Office of Emergency Management.
www.co.jefferson.co.us/sheriff/sheriff_T62_R191.htm

Jefferson County Open Space
<https://www.jeffco.us/814/Open-Space>
Jefferson County Economic Development Corporation



<https://jeffcoedc.org/the-competitive-edge/primary-employers/>

Jefferson County Demographics
<https://www.jeffco.us/2394/Demographics>

Jefferson County Economic Profile, EDC

Jefferson County Emergency Preparedness Guide.
www.co.jefferson.co.us/health/health_T111_R214.htm

Jefferson County Land Use Plan. www.co.jefferson.co.us/planning/planning_T59_R71.htm

Kaspersky Total Security – 2016 Story of the Year: the Ransomware Revolution.
https://media.kasperskycontenthub.com/wp-content/uploads/sites/43/2018/03/07182404/KSB2016_Story_of_the_Year_ENG.pdf

Lookout Mountain Water District. www.lookoutmountainwaterdistrict.org

Martin, Deborah A., and Moody, John. "Hydrologic and Erosion Responses of Burned Watersheds." April 4, 2007, http://www.brr.cr.usgs.gov/projects/Burned_Watersheds

Mc Kee et al. (1993); NOAA (1990); High Plains Regional Climate Center (1996) Albers Equal Area Projection.

Mile High Flood District. <https://mhfd.org/>

National Bridge Inventory. www.nationalbridges.com

National Centers for Environmental Information. <https://www.ncdc.noaa.gov/stormevents/>

National Drought Mitigation Center. www.drought.unl.edu

National Environmental Policy Act. www.epa.gov/compliance/nepa

National Fire Danger Rating System. www.wrh.noaa.gov/sew/fire/olm/nfdrs.html

National Flood Insurance Program. www.fema.gov/business/nfip

National Institute of Building Science Multi-Hazard Mitigation Council, 2011

National Lightning Safety Institute. www.lightningsafety.com

National Oceanic and Atmospheric Agency. www.noaa.gov

National Performance of Dams Program. <http://npdp.stanford.edu>

National Register of Historic Places. www.nps.gov/history/nr

National Resource Conservation Service Emergency Watershed Program.
<http://www.nrcs.usda.gov/programs/ewp/>

National Weather Association (NWA) Online Glossary. <http://www.weather.gov/glossary/>

National Weather Service. www.nws.noaa.gov



National Weather Service Pueblo Lightning Page. <http://www.crh.noaa.gov/pub/?n=ltg.php>

Noe, David C. Heaving –Bedrock Hazards, Mitigation, and Land-Use Policy: Front Range Piedmont, Colorado. Published 1997, http://www.surevoid.com/surevoid_web/soils/pub45.html

North Fork Fire Protection District. www.northforkfire.org

Patch.com, Bridges In Jefferson County Among About 35K Needing Repair, posted June 13, 2021, <https://patch.com/colorado/lakewood-co/bridges-jefferson-county-among-35k-needing-repair>

PERI Presidential Disaster Declaration Site. www.peripresdecusa.org/mainframe.htm

Planning and Flood Hazard Delineation Area for Clear Creek Drainageway
[http://udfcd.org/downloads/pdf/publications/fhad_new/Clear Creek FHAD Denver and Jeffco 2007.pdf](http://udfcd.org/downloads/pdf/publications/fhad_new/Clear_Creek_FHAD_Denver_and_Jeffco_2007.pdf)

Pleasant View Metropolitan District. www.pleasantviewfire.org

Precipitation Runoff Modeling System. http://cmd.gsfc.nasa.gov/records/USGS_PRMS.html

Rocky Mountain Insurance Information Association. www.rmiaa.org

Rocky Mountain News. www.rockymountainnews.com

Rogers, W.P.; Ladwig, L.R.; Hornbaker, A.L.; Schwochow, S.D.; Hart, S.S.; Shelton, D.C.; Scroggs, D.L.; and Soule, J.M. Guidelines and Criteria for Identification and Land-Use Controls of Geologic Hazard and Mineral Resource Areas (Special Publication 6, Colorado Geological Survey, 1974. Reprinted in 1979.) pp 71-72.

Seven News. <http://www.thedenverchannel.com/index.html>

Small Business Administration. www.sba.gov

Small Site Erosion and Sediment Control Manual published by the Jefferson County Planning and Zoning Division. http://co.jefferson.co.us/jeffco/planning_uploads/guides/small_site_erosion.pdf

Spatial Hazard Events and Losses Database for the United States.
<http://webra.cas.sc.edu/hvri/products/sheldus.aspx>

State of Colorado Natural Hazard Mitigation Plan, 2004.
www.dola.state.co.us/dem/mitigation/excrevision04.pdf

State of Colorado Natural Hazard Mitigation Plan, 2008.
https://www.dola.state.co.us/dem/mitigation/plan_2007/2008_plan.html

Studies of Post-Fire Erosion in the Colorado Front Range Benefit the Upper South Platte Watershed Protection and Restoration Project – Deborah Martin USGS 2000,
http://watershed.org/news/win_00/5_postfire.htm).

Topographic Map Valley Features in Jefferson County, Colorado.
<http://www.topozone.com/states/Colorado.asp?county=Jefferson&feature=Valley>

Town of Lakeside.

Town of Morrison. <http://town.morrison.co.us>



- Town of Mountain View. [http:// home.att.net/~mvpd](http://home.att.net/~mvpd)
- United States Army Corps of Engineers. www.usace.army.mil
- United States Bureau of Labor Statistics. www.bls.gov/
- United States Census Bureau. www.census.gov
- United States Department of Agriculture. www.usda.gov
- United States Department of Health and Human Services.
<https://empowermap.hhs.gov/>
- United States Drought Monitor. <https://droughtmonitor.unl.edu/>
- United States Fish and Wildlife Service. www.fws.gov
- U.S. Fish and Wildlife Service Mountain-Prairie Region. <http://www.fws.gov/mountain-prairie/co.html>
- United States Forest Service. www.usfs.gov
- United States Geological Survey. www.usgs.gov
- U.S. Seasonal Drought Outlook (housed by the Climate Prediction Center).
www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html
- University of Colorado at Boulder ATOC Weather Lab. <http://foehn.colorado.edu/weather>
- University of Nebraska Lincoln – National Drought Mitigation Center. <https://droughtreporter.unl.edu/map/>
- USGS Earthquake Hazards Program <http://earthquake.usgs.gov/regional/states/colorado/hazards.php>
- USGS Mountain Ground Water Resources Study.
co.jefferson.co.us/jeffco/planning_uploads/reports/mgwrs_sum1_report.pdf
- USGS publication “Distinguishing between Debris Flows and Floods from Field Evidence in Small Watersheds.” http://vulcan.wr.usgs.gov/Projects/FS2004-3142/FS2004-3142_tabloid_layout.pdf
- Wildland Fire Susceptibility Index. <http://www.westwideriskassessment.com/data/wwagisdata.html>
- XCEL Energy. www.xcelenergy.com



APPENDIX G: ACRONYMS AND DEFINITIONS

ACRONYMS

%g	Percentage of gravity
°C	Degrees Celsius
°F	Degrees Fahrenheit
ACS	American Community Survey
AHMAC	All-Hazard Mitigation Advisory Committee
BCA	Benefit-Cost Analysis
BCC	Board of County Commissioners
BCEGS	Building Code Effectiveness Grading Schedule
BLM	Bureau of Land Management
BRIC	Building Resilient Infrastructure and Communities
CAIC	Colorado Avalanche Information Center
CDC	Centers for Disease Control and Prevention
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health & Environment
CERC	Crisis and Emergency Risk Communication
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CGS	Colorado Geological Survey
CIP	Capital Improvement Plan
CIPP	Critical Infrastructure Protection Planning
CIS	Community Information System
CISA	Cyber & Infrastructure Security Agency
COOP	Continuity of Operations Plan
COVID-19	Coronavirus Disease 2019
CPA	Community Planning Areas
CPG	Comprehensive Preparedness Guide
CRS	Community Rating System
CSAS	Center for Snow and Avalanche Studies
CSFS	Colorado State Forest Service
CWCB	Colorado Water Conservation Board
CWPP	Community Wildfire Protection Plan
DEM	Digital Elevation Model



DFIRM	Digital Flood Insurance Rate Maps
DHSEM	Division of Homeland Security and Emergency Management
DMA	Disaster Mitigation Act
DMV	Department of Motor Vehicles
DNR	Colorado Department of Natural Resources
DOLA	Colorado Department of Local Affairs
DOT	U.S. Department of Transportation
DR	(Major) Disaster Declaration
DRCOG	Denver Regional Council of Governments
DSB	Colorado Dam Safety Branch
DWR	Colorado Department of Water Resources
EAP	Emergency Action Plan
ECOS	Environmental Conservation Online System
EHD	Environmental Health Department
EF	Enhanced Fujita
EM	Emergency Declarations
EMPG	Emergency Management Performance Grant
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
ERC	Energy Release Component
ESA	Endangered Species Act
FACE	Future Avoided Cost Explorer
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flooding Mitigation Assistance
FM	Fire Management Declaration
FPD	Fire Protection District
GIS	Geographic Information System
HAZMAT	Hazardous Materials
Hazus-MH	Hazards, United States-Multi Hazard
HIFLD	Homeland Infrastructure Foundation-Level Data
HHPD	High Hazard Potential Dam
HMA	Hazard Mitigation Assistance



HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HMPC	Hazard Mitigation Planning Committee
HIRA	Hazard Identification and Risk Assessment
HUD	Housing and Urban Development
HPL	High Potential Loss
IBC	International Building Code
ICC	International Code Council
IPP	Integrated Preparedness Plan
ISO	Insurance Services Office
JCOS	Jefferson County Open Space
LAL	Lightning Activity Level
LEPC	Local Emergency Planning Committee
LHMP	Local Hazard Mitigation Plan
MGWRS	USGS Mountain Ground Water Resources Study
MHFD	Mile High Flood District
MMI	Modified Mercalli Scale
Mph	Miles per Hour
NASA	National Aeronautics and Space Administration
NCEI	National Centers for Environmental Information
NDMC	National Drought Mitigation Center
NFDRS	National Fire Danger Rating System
NFHL	National Flood Hazard Layer
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NEPA	National Environmental Policy Act
NID	National Inventory of Dams
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRC	U.S. Coast Guard's National Response Center
NRCS	Natural Resource Conservation Service
NRP	Natural Resource Protection
NWS	National Weather Service
OEM	Office of Emergency Management
OIT	Office of Information Technology (State of Colorado)
ORM	Colorado Office of Risk Management



OSHA	Occupational Safety and Health Administration
PDI	Palmer Drought Index
PDM	Pre-Disaster Mitigation
PDS	Palmer Drought Severity Index
PGA	Peak Ground Acceleration
PIF	Pandemic Intervals Framework
PMRS	Precipitation Runoff Modeling System
PPE	Personal Protective Equipment
RMIIA	Rocky Mountain Insurance Information Association
SBA	Small Business Administration
SCADA	Supervisory Control and Data Acquisition
SCENIC	Southwest Climate and Environmental Information Collaborative
SFHA	Special Flood Hazard Area
SP	Standard Precipitation Index
SRL	Severe Repetitive Loss Properties
THIRA	Threat and Hazard Identification and Risk Assessment
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFW	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WHO	World Health Organization
WRCC	Western Regional Climate Center
WUI	Wildland Urban Interface

DEFINITIONS

100-Year Flood: The term “100-year flood” can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1% chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1% annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Acre-Foot: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Asset: An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity



and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the “100-year” or “1% chance” flood. The base flood is a statistical concept used to ensure that all properties subject to the NFIP are protected to the same degree against flooding.

Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as “watersheds” and “drainage basins.”

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit/cost analysis of proposed mitigation measures, benefits are limited to specific, measurable risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community’s current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency’s mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community’s actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Community Rating System (CRS): The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Critical Area: An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility: Facilities and infrastructure that are critical to the health and welfare of the population. These become especially important after any hazard event occurs. For the purposes of this plan, critical facilities include:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic or water reactive materials.
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for disaster response before, during, and after hazard events.
- Public and private utilities, facilities and infrastructure that are vital to maintaining or restoring normal services to areas damaged by hazard events.



- Government facilities.

Dam: Any artificial barrier or controlling mechanism that can or does impound 10 acre-feet or more of water.

Dam Failure: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Debris Flow: Dense mixtures of water-saturated debris that move down-valley; looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

Debris Slide: Debris slides consist of unconsolidated rock or soil that has moved rapidly down slope. They occur on slopes greater than 65%.

Disaster Mitigation Act of 2000 (DMA): The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP) were established.

Drainage Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds or basins**.

Drought: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. A hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, well-being, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

Earthquake: An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent: The extent is the size of an area affected by a hazard.

Fire Behavior: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel



conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

Flash Flood: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's FIRM. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A FIRM identifies most, but not necessarily all, of a community's floodplain as the SFHA.

Floodway: Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Floodway Fringe: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Freeboard: Freeboard is the margin of safety added to the base flood elevation.

Frequency: For the purposes of this plan, frequency refers to how often a hazard of specific magnitude, duration, or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1% chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Fujita Scale of Tornado Intensity: Tornado wind speeds are sometimes estimated on the basis of wind speed and damage sustained using the Fujita Scale. The scale rates the intensity or severity of tornado events using numeric values from F0 to F5 based on tornado wind speed and damage. An F0 tornado (wind speed less than 73 miles per hour [mph]) indicates minimal damage (such as broken tree limbs), and an F5 tornado (wind speeds of 261 to 318 mph) indicates severe damage.

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Geographic Information System (GIS): GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A hazard is a source of potential danger or adverse condition that could harm people or cause property damage.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster



Hazards U.S. Multi-Hazard (HAZUS-MH) Loss Estimation Program: HAZUS-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The HAZUS-MH software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. HAZUS-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. HAZUS-MH has also been used to assess vulnerability (exposure) for other hazards.

Hydrology: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Landslide: Landslides can be described as the sliding movement of masses of loosened rock and soil down a hillside or slope. Fundamentally, slope failures occur when the strength of the soils forming the slope exceeds the pressure, such as weight or saturation, acting upon them.

Lightning: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000°F. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year (see <http://www.fema.gov/hazard/thunderstorms/thunder.shtml>).

Liquefaction: Liquefaction is the complete failure of soils, occurring when soils lose shear strength and flow horizontally. It is most likely to occur in fine grain sands and silts, which behave like viscous fluids when liquefaction occurs. This situation is extremely hazardous to development on the soils that liquefy, and generally results in extreme property damage and threats to life and safety.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude: Magnitude is the measure of the strength of an earthquake, and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Initiatives (or Mitigation Actions): Mitigation initiatives are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal.

Peak Ground Acceleration: Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.



Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of \$1000.00; or
- Two paid flood losses in excess of \$1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Return Period (or Mean Return Period): This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

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

Risk Assessment: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Robert T. Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Sinkhole: A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

Special Flood Hazard Area: The base floodplain delineated on a FIRM. The SFHA is mapped as a Zone A in riverine situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.



Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

Thunderstorm: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Tornado: A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

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

Watershed: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

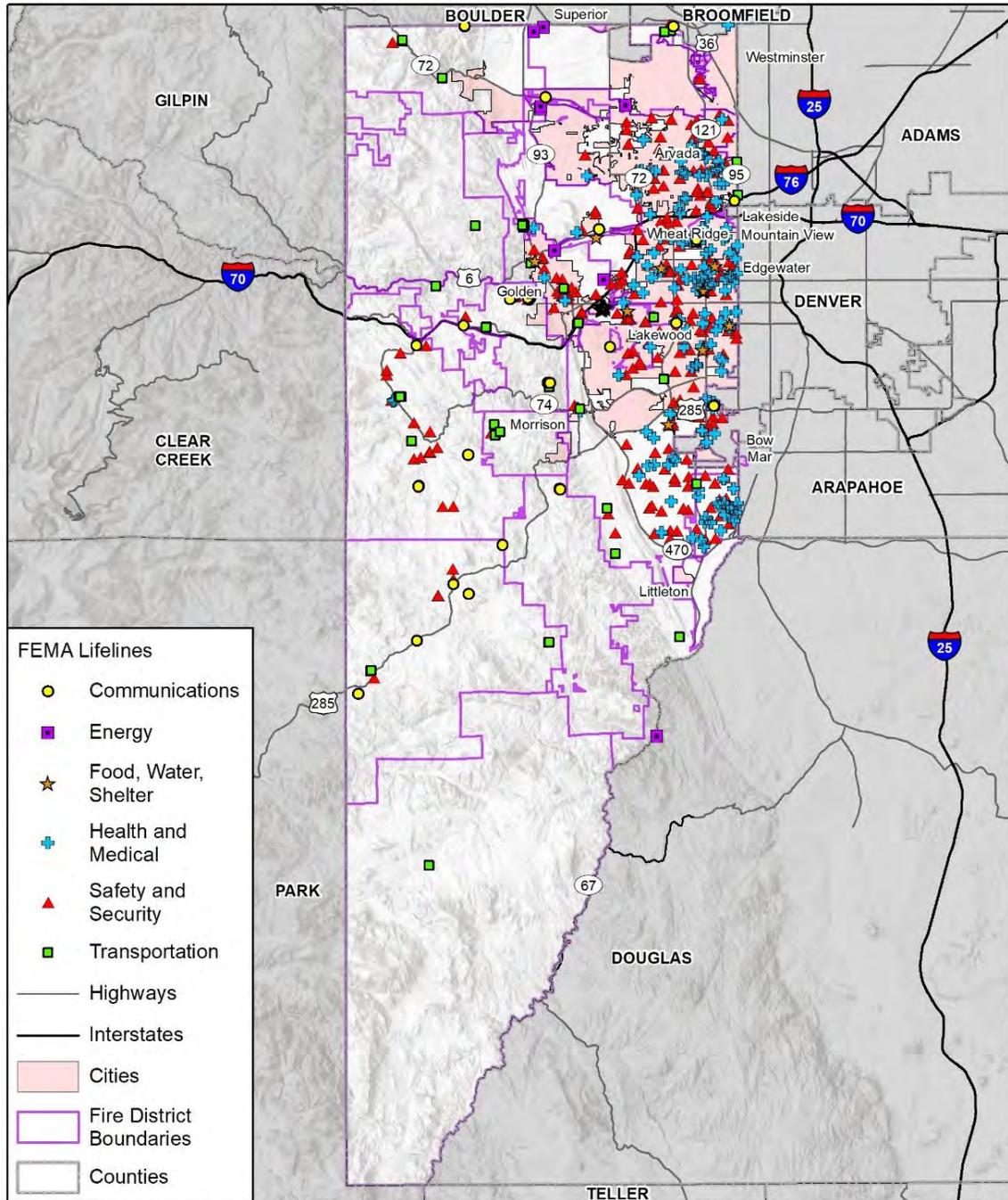
Wildfire: Wildfire refers to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography, and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. Topography includes both slope and elevation. Air mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use, and arson.

Windstorm: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.



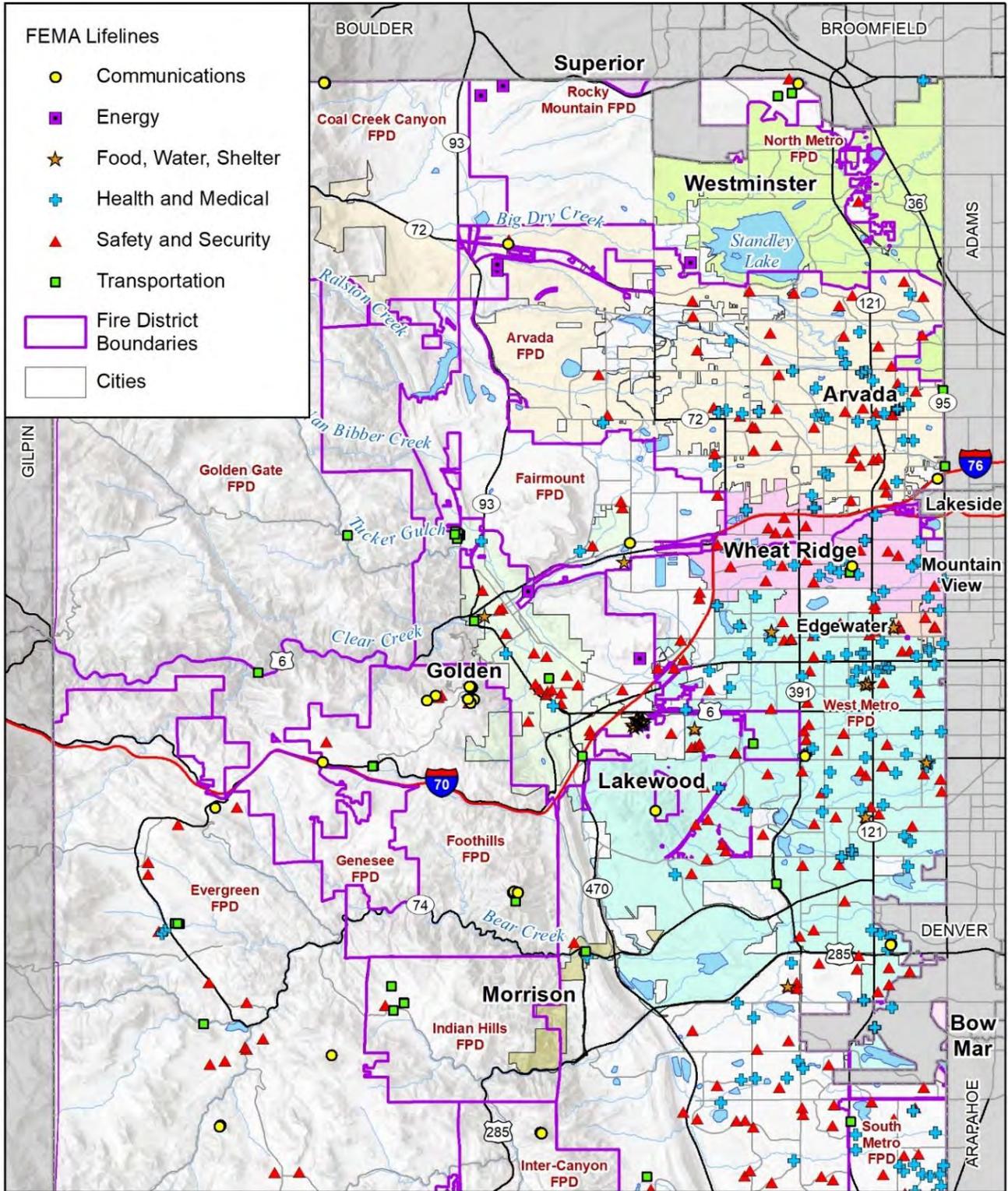
APPENDIX H: MAPS OF CRITICAL FACILITIES (NOT FOR PUBLIC RELEASE)



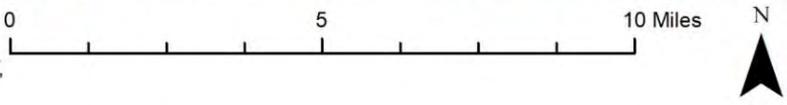
wood
Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
HIFLD

0 5 10 Miles





Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
HIFLD



Annex A. City of Arvada

A.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The City of Arvada fully participated in the 2021 update process as described in Section 3. The City had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section A.7. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the City on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

A.2 Community Profile

Figure A-1 shows a map of the City of Arvada.

A.2.1 History

The City of Arvada is a Home Rule Municipality located in Jefferson and Adams Counties in the Denver Metropolitan Area of the U.S. State of Colorado.

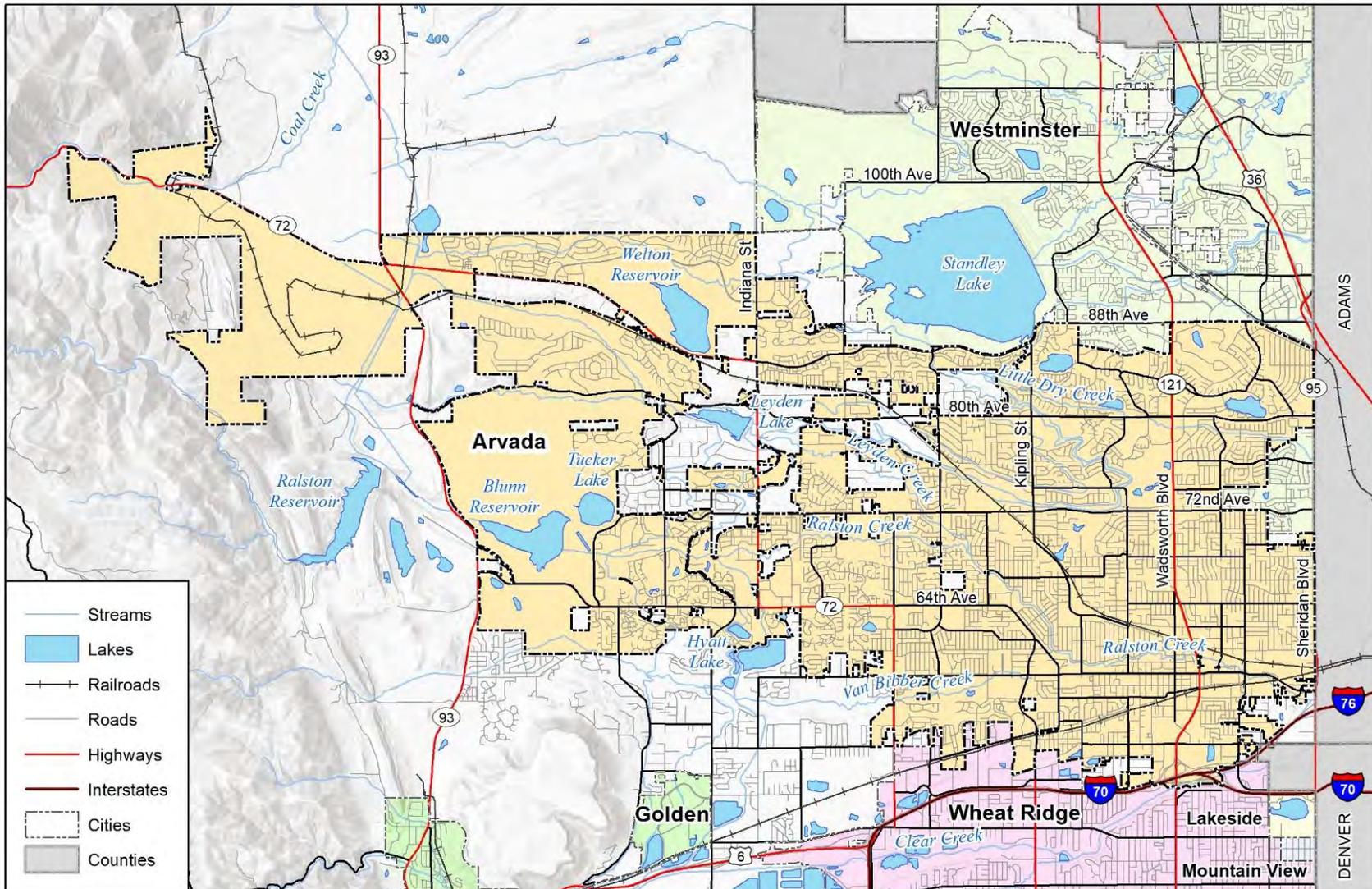
The first documented discovery of gold in the Rocky Mountain region occurred on June 22, 1850, when Lewis Ralston, a Georgia prospector headed for the California gold fields, dipped his sluice pan into a small stream near its mouth at Clear Creek. Ralston found about 1/4 ounce (6 g) of gold, then worth about five dollars. Ralston's companions named the stream Ralston's Creek in his honor, but they all left the next morning, drawn by the lure of the California gold fields.

During the Pike's Peak Gold Rush in 1858, Ralston brought another group of prospectors back to the site of his first discovery. The placer gold in the area soon played out, but hard rock deposits of gold were found in the mountains to the west. Some of the miners abandoned their search for gold and returned to farm the rich bottom land along Ralston Creek and Clear Creek. They found an eager market for their crops among other gold seekers. The Territory of Colorado was formed on February 28, 1861, and the farms in the valley expanded to feed the growing population of the region.

In 1870, the Colorado Central Railroad laid tracks through the area on its route from Golden to link up with the Kansas Pacific Railroad and the Denver Pacific Railroad at Jersey Junction, 3 miles north of Denver. On December 1, 1870, Benjamin F. Wadsworth and Louis A. Reno platted the Ralston Point townsite along the railroad. To avoid confusion with other communities along Ralston Creek, Ralston Point was soon renamed Arvada in honor of Hiram Arvada Haskin. Benjamin Wadsworth became the first postmaster of Arvada. Colorado was granted statehood on August 1, 1876, and the Town of Arvada was formally incorporated on August 14, 1904. A vibrant agricultural community, Arvada claimed the title "Celery Capital of the World."

Arvada grew rapidly during the latter half of the 20th century as a suburb of nearby Denver, the state capital. Arvada became a Statutory City on October 31, 1951, and a Home Rule Municipality on July 23, 1963. By the end of the millennium, the population of Arvada exceeded 100,000.

Figure A-1 City of Arvada



wood. Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

A.2.2 Population

The U. S. Census Bureau’s estimated 2019 population of Arvada was 118,746. The following tables and graphs summarize key demographic and social characteristics of the City of Arvada based on the U.S. Census Bureau’s American Community Survey, 5-Year Estimates, 2015-2019.

Table A-1 Arvada Demographic and Social Characteristics

Arvada	2015	2019	% Change
Population	111,658	118,746	6.35%
Median Age	40.9	40.2	-1.7%
Total Housing Units	45,887	49,038	6.9%
Housing Occupancy Rate	97.2%	96.9%	-0.3%
% of Housing Units with no Vehicles Available	4.00%	3.2%	-20.0%
Median Home Value	\$257,300	\$384,500	49.4%
Unemployment Rate	6.0%	3.8%	-36.7%
Mean Travel Time to Work (minutes)	27	28	3.7%
Median Household Income	\$69,938	\$84,717	21.1%
Per Capita Income	\$35,158	\$42,921	22.1%
% of Individuals Below Poverty Level	8.4%	5.8%	-31.0%
% Without Health Insurance	11.3%	5.0%	-55.8%
# of Households	46,055	47,507	3.2%
Average Household Size	2.5	2.49	0.0%
% of Population Over 25 with High School Diploma or Higher	94.2%	94.3%	0.1%
% of Population Over 25 with Bachelor's Degree or Higher	39.8%	41.1%	3.3%
% with Disability	11.3%	10.9%	-3.5%
% Speak English less than "Very Well"	2.2%	2.4%	9.1%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table A-2 Arvada Demographic & Social Characteristics Compared to the County & State

Demographic & Social Characteristics (as of 2019)	Arvada	County	Colorado
Median Age	40.2	40.3	36.7
Housing Occupancy Rate	96.9%	96.4%	90.0%
% of Housing Units with no Vehicles Available	3.2%	3.9%	5.1%
Median Home Value	\$384,500	\$397,700	\$343,300
Unemployment	3.8%	3.6%	4.3%
Mean Travel Time to Work (minutes)	28	28	25.8
Median Household Income	\$84,717	\$82,986	\$72,331
Per Capita Income	\$42,921	\$44,119	\$38,226
% of Individuals Below Poverty Level	5.8%	7.1%	10.3%
% Without Health Insurance	5.0%	5.5%	7.6%
Average Household Size	2.49	2.40	2.56

Demographic & Social Characteristics (as of 2019)	Arvada	County	Colorado
% of Population Over 25 with High School Diploma or Higher	94.3%	94.5%	91.7%
% of Population Over 25 with bachelor's degree or Higher	41.1%	45.2%	40.9%
% with Disability	10.9%	10.0%	10.6%
% Speak English less than "Very Well"	2.4%	3.0%	5.8%

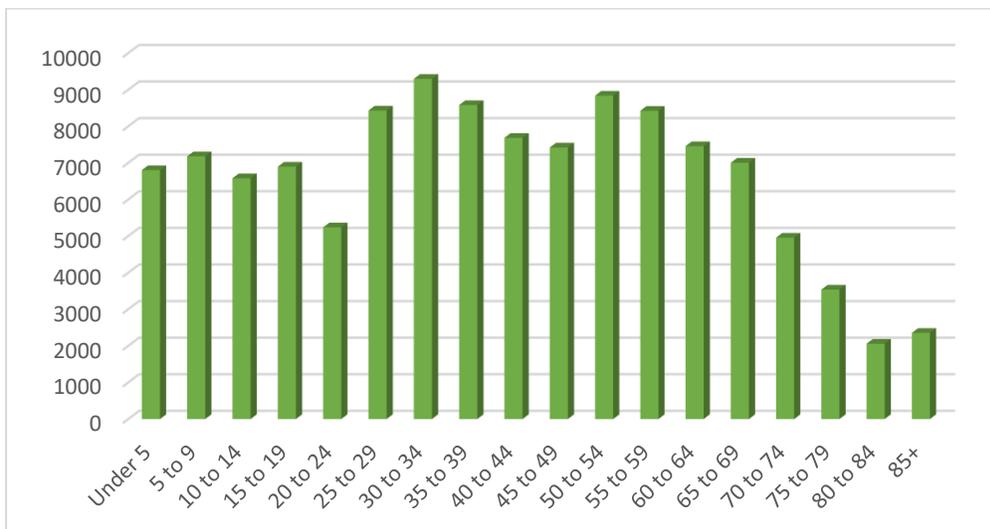
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table A-3 Arvada Demographics by Race and Sex

Arvada	Population	%
Total Population	118,746	
Male	58,027	48.9%
Female	60,719	51.1%
White, not Hispanic	94,995	80.0%
Hispanic or Latino	17,032	14.3%
Black	1,423	1.2%
Asian	2,371	2.0%
American Indian and Alaska Native	478	0.4%
Native Hawaiian and Other Pacific Islander	52	0.0%
Some other race	131	0.1%
Two or more races	2,264	1.9%

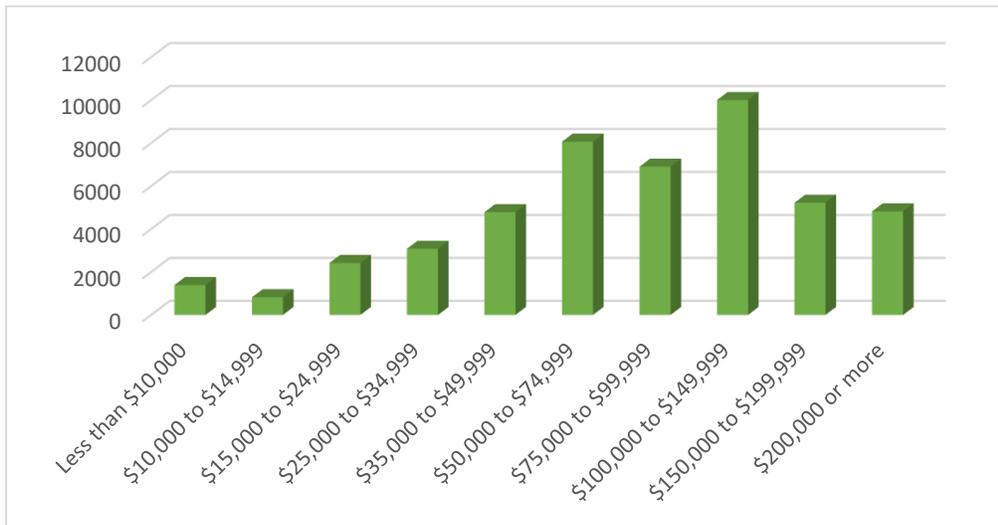
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Figure A-2 Arvada Population by Age



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Figure A-3 Arvada Income Distribution



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

A.2.3 Social Vulnerability

Social vulnerability scores for the City of Arvada can be seen in Figures 2-2 through 2-6 in Section 2 of the Base Plan. The City of Arvada is characterized by a mix of low (bottom 20% in the county) to high (top 20% in the county) levels of social vulnerability. The more socially vulnerable areas are generally clustered in the eastern part of the City, although some areas in the western part of the City do score above average in housing and transportation vulnerability. Resources and measures to reduce the social determinants of disasters may be most effectively allocated to these areas. Moreover, it is critical that the City analyze the individual social vulnerability indicators that make those parts of the community stand out. Research from other disaster events like Superstorm Sandy shows that social connections among neighbors are a key foundation to resilience and bouncing back after a disaster event. The City of Arvada acknowledges and implements this principle into its Neighbors Connected Program and Resilient Neighborhoods Partnership work to create an environment in Arvada where social cohesion can prosper through mechanisms like block parties, neighborhood improvement grants, and preparedness workshops. Through ongoing evaluation, the City of Arvada will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

A.2.4 Growth and Development Trends

Table A-4 shows the various types and amounts of housing units in the City of Arvada based on data from the American Community Survey Five Year Estimates for 2015-2019. As shown in the table, most housing units (71.5%) are single family homes (1-unit detached) in Arvada.

Table A-4 Arvada Types and Total Housing Units

Type of Housing Units	Total	%
Total housing units	49,038	
1-unit detached	35,040	71.5%
1-unit attached	3,475	7.1%
2 units	443	0.9%
3 or 4 units	1,681	3.4%
5 to 9 units	2,032	4.1%
10 to 19 units	2,312	4.7%

Type of Housing Units	Total	%
20 or more units	3,962	8.1%
Mobile home	74	0.2%
Boat, RV, van, etc.	19	0.0%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table A-5 illustrates how Arvada has undergone steady growth in terms of population and number of housing units between 2010 and 2019.

Table A-5 Arvada’s Change in Population and Housing Units, 2010-2019

2010 Population	2019 Population Estimate	Estimated Percent Change 2010-2019	2010 # of Housing Units	2019 Estimated # of Housing Units	Estimated Percent Change 2010-2019
106,474	118,746	11.5%	43,952	49,038	11.6%

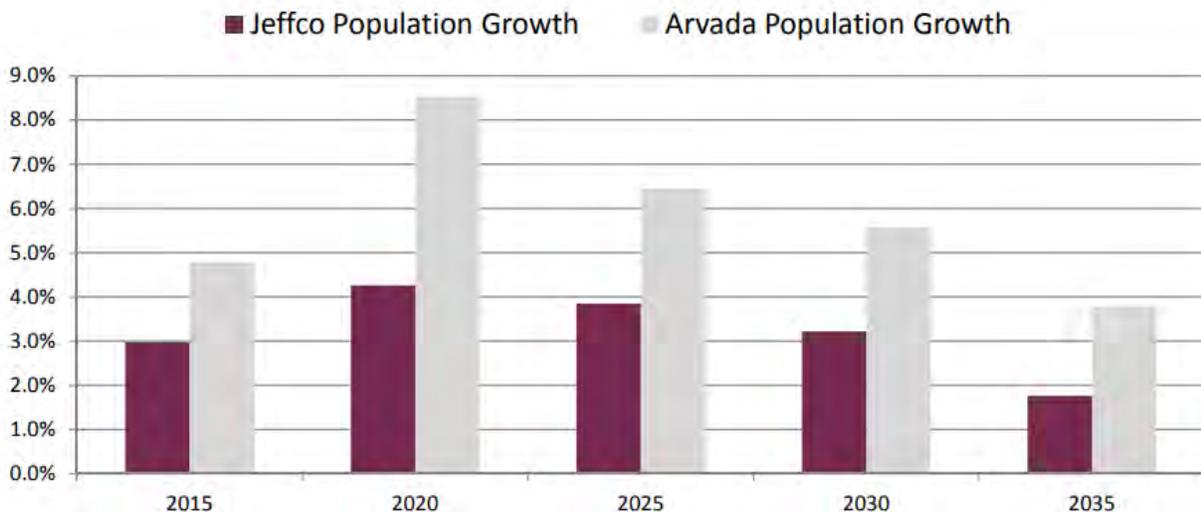
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

According to the HMPC, Arvada has seen a general trend in smaller parcel development and the continued development in the western portion of the Candelas development, located in the northeast portion of the City. The Gross Reservoir is also proposed to be built and filled in conjunction with the development in the west. The Candelas development near highways 93 and 72 is an area subject to high winds and brush fires and has mapped areas of subsidence and dipping bedrock.

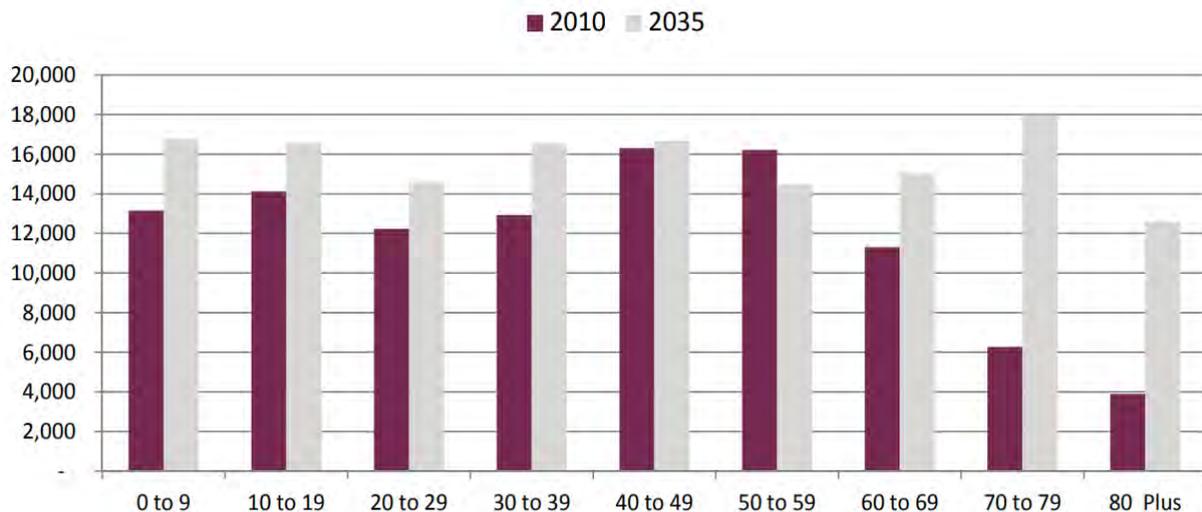
The HMPC also noted there is redevelopment of existing parcels and infill development also occurring and is likely to continue as developable parcels become more limited in the City.

Figure A-4 shows Arvada’s estimated population changes through 2035 assuming historic growth patterns compared to Jefferson County. According to the City of Arvada Comprehensive Plan, while Arvada is expected to grow faster than the County as a whole, it will largely depend on the availability of buildable greenfield land, redevelopment opportunities, and the community’s feelings toward city growth and the economy (Arvada 2014). Figure A-5 shows the projected changes in age distribution in the City by 2035. The growth in the 60 years and older demographic is projected to increase significantly by 2035.

Figure A-4 City of Arvada Projected Population Growth



Source: City of Arvada Comprehensive Plan, Appendix A Demographic Profile & Projections, Steven B. Fisher and State Demography Office

Figure A-5 City of Arvada Age Distribution 2010 Census vs 2035 Projection


Source: City of Arvada Comprehensive Plan, Appendix A Demographic Profile & Projections, Steven B. Fisher and State Demography Office

A.2.5 Natural, Cultural, and Historic Resources

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

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

Natural Resources

The City of Arvada has an outstanding parks and recreation system, and over 2,175 acres of open space within the Planning Area boundaries, over 90 neighborhood parks, nine regional parks and open space areas, and vast protected areas of open space owned by Jefferson County, and cities of Boulder, Denver, and Westminster adjacent to the Planning Area boundaries. For information about natural resources in Jefferson County, which includes Arvada, see Section 4.2.3 of the Base Plan.

Historic and Cultural Resources

Table A-6 lists the properties in Arvada that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties; for more information about these registers, see Section 4.2.3 in the Base Plan.

Table A-6 Arvada's Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Arvada Downtown (Olde Town)	5580-5773 Wadsworth Blvd., 7207-7612 Grandview Ave., 755 Grant Pl., 5690 Yukon St., and 7314-7510 W. 57th Ave.	7/15/1998
Arvada Flour Mill	5580 Wadsworth Blvd.	4/24/1975
Churches Ranch	17999 W. 60 th Ave	7/23/1998

Property	Address	Date Listed
Reno Park Addition Historic District	7799-7899 W. 57th Ave., 7801-7906 Grandview Ave., 7800 & 7884 Ralston Rd., 5603-5720 Yarrow St., 5701-5723 Yukon St., & 5604-5723 Zephyr St.	9/29/1999
Russell-Graves House	5605 Yukon St.	5/9/1983
Seven Day Adventist Church – Arvada Jaycee Hall	5640 Yukon St.	2/24/2011
Stocke, Walter Addition Historic District	6701-7014 Grandview Ave., 5708-7006 Ralston Rd., 5712-5724 Reed St. & 5705-5726 Saulsbury St.	9/24/1999
Enterprise Grange No. 15	7203 Simms St.	State Register 8/11/1999
Ralston Cemetery	14600 Block of 62 nd Ave.	6/30/2011
Ralston Gold Discovery Site (Gold Strike Park)	56th Ave. & Fenton St.	State Register 12/13/1995

Sources: National Register of Historic Places, <https://www.nps.gov/subjects/nationalregister/> and Colorado State Register of Historic Properties: <https://www.historycolorado.org/colorado-state-register-historic-properties>

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. There is currently one Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) building in the City of Arvada.

Table A-7 Architecturally Significant Buildings in Arvada

Property	Address
William Graves House	5250 Marshall St, Arvada Co

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.

A.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the City of Arvada using the same methodology as in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Table A-8 lists the significance of each hazard for the City of Arvada based on the updated risk assessment and planning team input. The highest risk hazards were determined to be flood, wildfire, and windstorm.

Table A-8 City of Arvada – Hazards Summary

Hazard	Geographic Extent	Probability of Future Occurrence	Potential Severity/Magnitude	Overall Significance
Avalanche	Limited	Unlikely	Negligible	Low
Cyber Attack	Extensive	Occasional	Significant	Medium
Dam Failure	Significant	Unlikely	Significant	Medium
Drought	Extensive	Occasional	Critical	Medium
Earthquake	Extensive	Unlikely	Negligible	Low
Erosion and Deposition	Significant	Unlikely	Negligible	Low
Expansive Soils	Limited	Likely	Negligible	Low
Extreme Temperatures	Extensive	Occasional	Limited	Medium
Flood	Extensive	Likely	Limited	High
Hailstorm	Extensive	Occasional	Negligible	Medium
Landslide, Debris flow, Rockfall	Limited	Unlikely	Negligible	Low
Lightning	Extensive	Highly	Negligible	Low
Pandemic	Extensive	Occasional	Significant	Medium
Severe Winter Storms	Significant	Likely	Negligible	Low
Subsidence	Limited	Unlikely	Negligible	Low
Tornado	Extensive	Unlikely	Limited	Medium
Wildfire	Significant	Occasional	Limited	High
Windstorm	Extensive	Likely	Negligible	High

<p>Geographic Extent</p> <p><u>Negligible</u>: Less than 10 percent of planning area or isolated single-point occurrences</p> <p><u>Limited</u>: 10 to 25 percent of the planning area or limited single-point occurrences</p> <p><u>Significant</u>: 25 to 75 percent of planning area or frequent single-point occurrences</p> <p><u>Extensive</u>: 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Severity/Magnitude</p> <p><u>Negligible</u>: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.</p> <p><u>Limited</u>: 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.</p> <p><u>Critical</u>: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.</p> <p><u>Catastrophic</u>: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>	<p>Probability of Future Occurrences</p> <p><u>Unlikely</u>: Less than 1 percent probability of occurrence in the next year or has a recurrence interval of greater than every 100 years.</p> <p><u>Occasional</u>: Between a 1 and 10 percent probability of occurrence in the next year or has a recurrence interval of 11 to 100 years.</p> <p><u>Likely</u>: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years</p> <p><u>Highly Likely</u>: Between 90 and 100 percent probability of occurrence in the next year or has a recurrence interval of less than 1 year.</p> <p>Overall Significance</p> <p><u>Low</u>: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. Also used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.</p> <p><u>Medium</u>: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. Also used for hazards with a high impact rating but an extremely low frequency.</p> <p><u>High</u>: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. Also used for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>
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A.4 Community Asset Inventory

Table A-9 shows the total number of improved parcels, properties, and their improvement and content values for the City of Arvada. See Section 4.2 of the Base Plan for details and methodology.

Table A-9 City of Arvada's Property Inventory

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Agriculture	8	8	\$2,760,667	\$2,760,667	\$5,521,334
Commercial	515	856	\$550,997,194	\$550,997,194	\$1,101,994,388
Exempt	125	144	\$312,137,969	\$312,137,969	\$624,275,938
Industrial	199	247	\$212,035,772	\$318,053,658	\$530,089,430
Mixed Use	147	184	\$130,816,114	\$130,816,114	\$261,632,228
Residential	41,028	42,558	\$13,048,341,862	\$6,524,170,931	\$19,572,512,793
Total	42,022	43,997	\$14,257,089,578	\$7,838,936,533	\$22,096,026,111

Source: Jefferson County Assessor's Office

Table A-10 is a detailed inventory of assets identified by the City's planning team. This inventory includes some critical facilities. For more information about how "critical facility" is defined in this plan, see Section 4.2.2 of the Base Plan.

Table A-10 Summary of Arvada's Assets

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Arvada City Hall 8101 Ralston Rd, Arvada, CO 80002	\$21 million	Approx. 400	City, PW, and Police administration; EOC
Arvada Center for Performing Arts 6901 Wadsworth Blvd, Arvada, CO 80003	\$25 million	Up to 5000	Mass Casualty
Arvada Municipal Services Facility 6701 Indiana St., Arvada, CO 80007	\$26 million	Approx. 100	Arvada fleet facilities, alternate EOC
Ralston WTP, 18975 W. 66 th Ave., Arvada, CO 80007	\$21 million	Approx. 4	Water treatment plant
Parks Maintenance Facility, 7800 W. 62 nd Ave, Arvada CO 80003	\$7 million	Approx. 50	Maintenance Facility
Wastewater/Stormwater Facility, 5555 W. 56 th Ave, Arvada, CO 80002	\$3 million	Approx. 25	Wastewater system maintenance facility
Hill Petroleum, 6291 Ralston Rd, Arvada, CO 80002		Unknown	Hazardous materials
Industrial Chemical Corp., 4631 W, 58 th Ave., Arvada, CO 80002		Unknown	Hazardous materials
Great West Inorganics		Unknown	Hazardous materials
Plains End Generation Facility		Unknown	Natural gas
Railroad Bridge, 56 th & Wadsworth, Arvada, CO 80002			Railroad bridge
Railroad Lines, Arvada, CO			Railroad lines
Olde Town Arvada, Arvada, CO 80002		Up to 2500	City business center
Schools – see Jefferson County Schools submittal			
Fire Protection District Headquarters	\$3.2 million		

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Fire Station 1	\$2 million		
Fire Station 2	\$2 million		
Fire Station 3	\$2 million		
Fire Station 4	\$2 million		
Fire Station 5	\$2 million		
Fire Station 6	\$4 million		
Fire Station 7	\$2 million		
Fire Station 8	\$2 million		
Training/Maintenance	\$9 million		
Special Needs Facilities – refer to Jefferson County			

Many of the facilities listed above are also in GIS databases provided by the City of Arvada and Jefferson County. Table A-11 lists summary information about the 289 critical facilities and other community assets identified by the City as important to protect or that provide critical services in the event of a disaster. The critical facilities are organized by FEMA Lifelines. For additional information on the definitions behind each critical facility category, source, and other details refer to Section 4.2.2 of the Base Plan.

Table A-11 Summary of Arvada’s Critical Facilities in GIS

FEMA Lifeline	Count
Communications	93
Energy	8
Hazardous Materials	15
Health and Medical	42
Safety and Security	51
Transportation	80
Total	289

Source: HIFLD and CERC

A.5 Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the City of Arvada, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the City’s risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soils
- Extreme Temperatures
- Hailstorm
- Lightning
- Tornado
- Windstorm
- Winter Storm
- Cyber Attack
- Pandemic/Public Health

The following sections detail vulnerability to specific hazards, where quantifiable, and where it differs from that of the overall County. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas. For a discussion of the methodology used to develop the loss estimates refer to Section 4.3 of the Base Plan.

A.5.1 Dam Failure

Past Events

Based on a search of the National Performance of Dams database there have been thirteen incidents in Jefferson County since 1952. Of these incidents reported to the National database, three incidents including one dam failure list Arvada as the nearest town to the event, as shown in Table A-12.

Table A-12 Dam Failure and Incidents

Date	Dam Name	Waterway	Dam Hazard Potential	Event Description	Failure?
1974	Oberon Lake No. 1	Ralston Creek	Significant	Inflow flood-hydrologic event	Yes
Sept. 12, 2013	Leyden	Chase Gulch	High	Hydrologic/flooding	No
Sept. 13, 2013	Tucker Lake – South Dam	S. Platte River	High	Hydrologic/flooding – High Reservoir Level	No

Source: National Performance of Dams database, Stanford University and Association of State Dam Safety Officials Dam Incident Database, City of Arvada

Two of the incidents listed in Table A-12 were related to the September 2013 flood event. While neither dam failed, discharge from the Leyden Dam reached an estimated 1,351 cfs, far exceeding the design discharge for the 3-hour 100-year storm of 373 cfs. Significant downstream flooding occurred, with several roads being overtopped and/or eroded, and several homes along Leyden Creek experiencing damage and sewer backups.

Dams of Concern

Table 4-11 in Section 4.3.3 of the Base Plan lists dams of concern for Jefferson County. Dams upstream of the City of Arvada are shown in Table A-13.

Arvada has eight high hazard, and one significant hazard dams whose failure could impact life and/or property. Note: Hazard class does not indicate dam condition, it merely indicates risks in case of failure. A high hazard dam poses risk to both life and property, a significant hazard dam only poses a risk to property. See discussion the Section 4 of the Base Plan. Dam names with an asterisk (*) next to them have been given a conditionally satisfactory or unsatisfactory rating by the State Engineer, meaning they have storage restrictions due to structural concerns. As of February 2021, 33 dams in Jefferson County were given the conditionally satisfactory or unsatisfactory ratings. While 23 of these are low hazard dams, 2 are rated significant hazard and 8 are rated high hazard. Of these dams, three pose a concern to the City of Arvada.

Table A-13 Dams of Concern to City of Arvada

Dam Name	Stream	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Blunn	Ralston Creek	6,361	Yes	High
Hyatt*	Van Bibber Creek	760	Yes	High
Leyden	Leyden Creek	90	Yes	High
Lower Long Lake*	Ralston Creek	292	Yes	High
Ralston	Ralston Creek	10,749	Yes	High
Tucker Lake - North Dam	Ralston Creek	586	Yes	High
Tucker Lake - South Dam	Ralston Creek	882	Yes	High
Upper Long Lake*	Ralston Creek	1,500	Yes	High
Pomona No. 2 And No. 3*	Little Dry Creek	114	Yes	Significant

Source: National Inventory of Dams, NHD

Non-Failure Dam Incidents

As discussed in Section 4.3.3 of the Base Plan, the Colorado Department of Natural Resources, Dam Safety Division, has a statewide database that identifies the potential for non-failure dam inundation to show potential areas of flooding where outlet capacity exceeds the downstream channel capacity. The dams at the highest risk of non-failure inundation are shown in Table 4-14 of the Base Plan. The ranking shown in the table represents the likelihood of hazardous conditions existing below the dams during a worst case, maximum outlet release scenario. Dams are ranked as high, moderate, or low likelihood for outlet releases to cause conditions that could require an emergency response to reduce potential downstream consequences. The ranking is based on a statewide database of high hazard dams that includes 441 high hazard dams that have been analyzed by the Colorado DNR for this aspect of dam incident flooding. The high, moderate, or low designations were assigned by DNR by dividing the total number of ranked dams across the state into thirds. Should there be a need to relieve pressure on the dam (e.g., if there was excess inflow from high rains or snowmelt) releases from the dams ranked as high or moderate may result in downstream flooding. The following dams are within or upstream of Arvada and have a risk of non-failure inundation.

Table A-14 Dams with Risk of Non-Failure Inundation

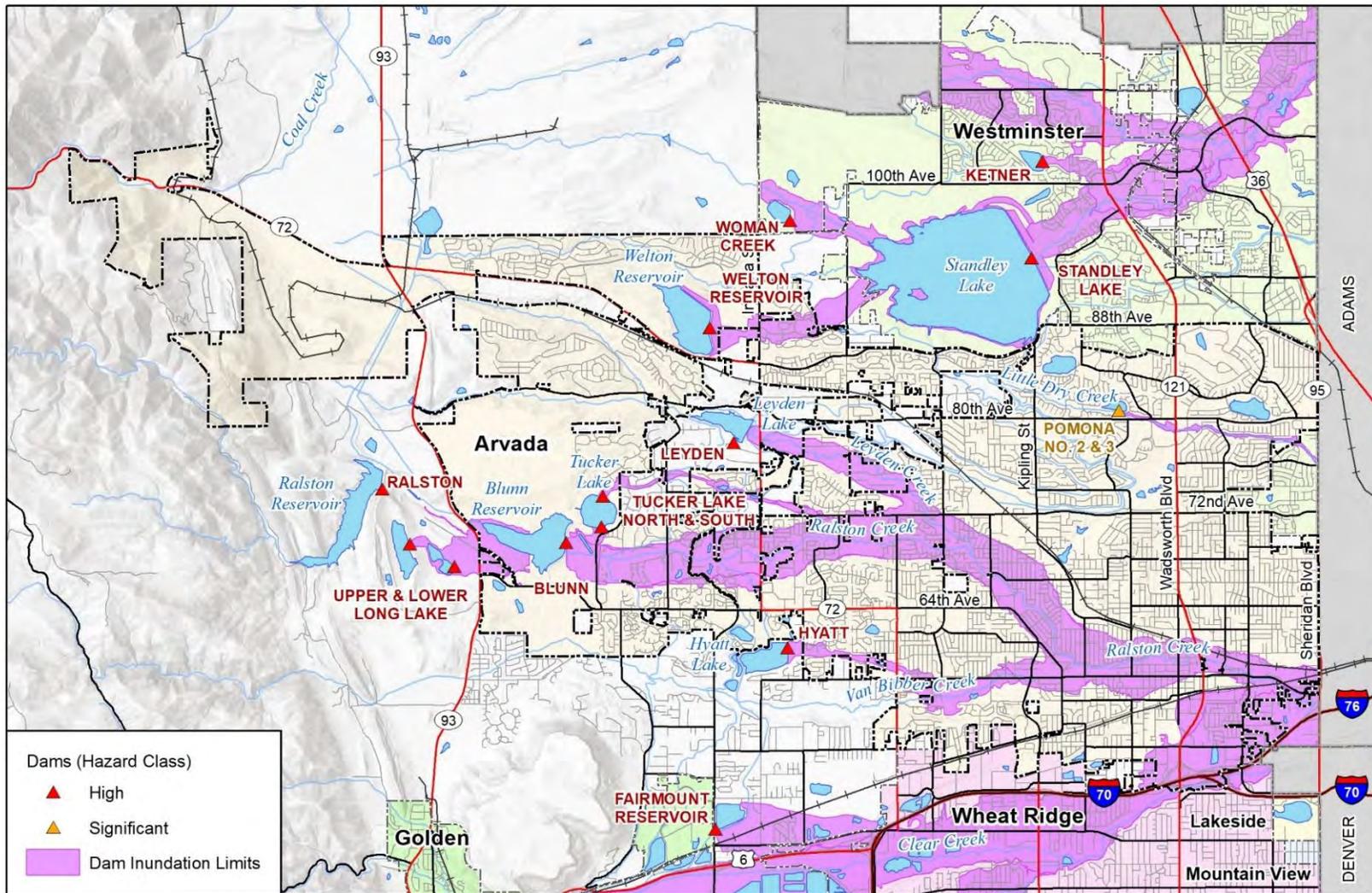
Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
070302	Blunn	48" RCP	420	6	High
070209	Leyden	36" CIP	193	23	High
070224	Ralston	60" STEEL	650	8	High
070232	Tucker Lake - South Dam	2- 15" RCP	34	246	Moderate
070136	Hyatt	8"&10" PVC, sliplined old pipes	18	296	Low
070320	Tucker Lake - North Dam	12" RCP	0	348	Low
070114	Upper Long Lake	18" CIP	61	367	Low

Source: State of Colorado Department of Natural Resources, Dam Safety Division

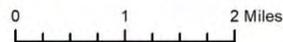
Low Head Dams in City of Arvada

A low head dam is an engineered structure built into and across stream and river channels. Low head dams were historically built for a variety of purposes to support industrial, municipal, and agricultural water usage through the diversion of water from streams. Low head dams have also been built to provide recreational amenities for boating, rafting and tubing as well as improve aquatic habitats (Colorado DNR). Water flows over the dams creating a recirculating current that can trap unknowing river users. Due to the low height of this type of dam, low head dams can be difficult to see by river users that are not aware of them and because of the tranquil pool that gives the appearance there is no danger. There are 5 low head dams identified in the City of Arvada along Ralston Creek. Of these 5 low head dams, 4 are categorized as "grade control structure" and 1 as "diversion dam". Refer to Figure 4-9 in Section 4.3.3 of the Base Plan.

Figure A-6 Dam Inundation Areas in City of Arvada



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety



Estimating Potential Losses

Table A-15 shows that Arvada has the highest number of parcels exposed to dam inundation hazards in the County. There are over 6,000 parcels or 16% of total parcels in the city that are potentially exposed with a total value of \$4.1 Billion. Of the parcels exposed, 6,530 are residential properties potentially exposing 16,194 residents to dam inundation hazards.

Table A-15 Dam Inundation Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Agriculture	3	3	\$265,224	\$265,224	\$530,448	
Commercial	174	238	\$191,228,879	\$191,228,879	\$382,457,758	
Exempt	23	26	\$35,076,293	\$35,076,293	\$70,152,586	
Industrial	135	174	\$140,155,569	\$210,233,354	\$350,388,923	
Mixed Use	56	75	\$43,559,327	\$43,559,327	\$87,118,654	
Residential	6,530	6,911	\$2,165,822,805	\$1,082,911,403	\$3,248,734,208	16,194
Total	6,921	7,427	\$2,576,108,097	\$1,563,274,479	\$4,139,382,576	16,194

Source: Jefferson County Assessor, National Inventory of Dams, NHD

Critical Facilities

There are 98 critical facilities identified in areas at risk of dam inundation in the City of Arvada, shown in Table A-16. Bridges and communication towers are listed most often as exposed to dam inundation hazards.

Table A-16 Critical Facilities Potentially at Risk of Dam Inundation, by FEMA Lifeline

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	22
	Microwave Service Towers	10
Hazardous Material	Tier II	8
Health and Medical	Nursing Home	1
Safety and Security	EOC	1
	Law Enforcement	2
	School	5
Transportation	Bridge	49
Total		98

Source: National Inventory of Dams, HIFLD and CERC

A.5.2 Flood

Past Events

September 2013 Flood

Between September 9 and 14, 2013, the Denver Metro Area and the City of Arvada experienced a significant rain event. Rain in parts of Arvada ranged from 7.24 to 15.16 inches over five consecutive days (Urban Drainage and Flood Control District). Rainfall in the City of Arvada normally averages 18.93 inches *per year* (National Weather Service). The most significant impact from this rain event was felt along the Leyden and Ralston Creek drainage areas, although all areas of the city received significant rainfall.

Jefferson County requested and received a Presidential Declaration that made the City of Arvada eligible for both FEMA Public Assistance and Individual Assistance as well as Federal Highway Administration assistance.

Estimating Potential Losses

Figure A-7 depicts the FEMA flood zones (1% annual chance and 0.2% annual chance) and Figure A-7 shows the locations of properties at risk of flooding in the City of Arvada. Flooding in Arvada is likely to be the result of overbank flooding from Ralston, Leyden, and Little Dry Creeks.

As shown in Table 4-38 in Section 4.3.9 of the Base Plan, the City of Arvada has 631 improved parcels, and 692 buildings within the 1% annual chance flood with an estimated loss of \$80,101,715. Of the buildings in the 1% annual flood area, 654 are considered residential, exposing an estimated 1,622 residents to flooding. There are an additional 722 parcels with 804 buildings located in the 0.2% annual chance flood hazard area, with estimated loss of \$161,488,232. There are 684 residential buildings in the 0.2% annual flood area and an estimated 1,696 residents potentially exposed. Based on this analysis, Arvada has the greatest potential losses in the County from 500-year flooding, based on combining the 1% and 0.2% building counts which roughly total 1,353 buildings exposed to flooding and estimated \$241,589,947 in combined losses. Note that this analysis does not account for properties which may have been built in accordance with local floodplain regulations and mitigated to the 1% annual chance flood.

Table A-17 and Table A-18 show the total parcels and buildings at risk to the 1% and 0.2% annual chance flood. See Section 4 Hazard Profiles of the Base Plan for details on methodology.

Table A-17 Arvada Values At-Risk to 1% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss (25%)	% of Total Parcels
Commercial	10	20	\$11,938,573	\$11,938,573	\$23,877,146	\$5,969,287	
Exempt	3	4	\$479,778	\$479,778	\$959,556	\$239,889	
Industrial	4	5	\$5,550,988	\$8,326,482	\$13,877,470	\$3,469,368	
Mixed Use	1	9	\$1,760,791	\$479,778	\$959,556	\$239,889	
Residential	613	654	\$187,155,422	\$93,577,711	\$280,733,133	\$70,183,283	
Total	631	692	\$206,885,552	\$114,802,322	\$320,406,861	\$80,101,715	2%

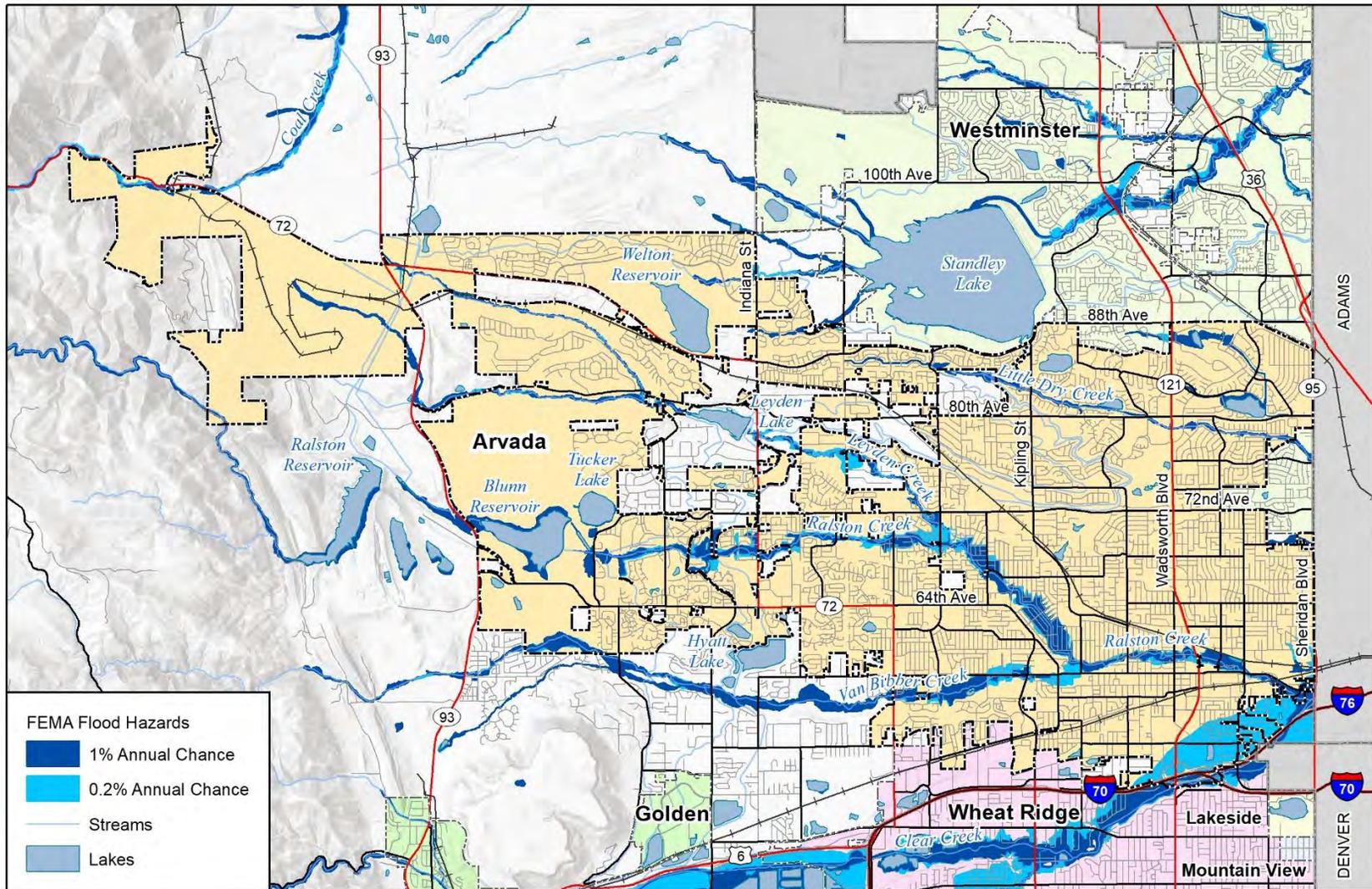
Source: Wood analysis with Jefferson County Assessor's Data

Table A-18 Arvada Values At-Risk to 0.2% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss (25%)	% of Total Parcels
Agriculture	3	3	\$265,224	\$265,224	\$530,448	\$132,612	
Commercial	44	63	\$68,906,209	\$68,906,209	\$137,812,418	\$34,453,105	
Exempt	2	2	\$2,159,510	\$2,159,510	\$4,319,020	\$1,079,755	
Industrial	35	42	\$54,539,458	\$81,809,187	\$136,348,645	\$34,087,161	
Mixed Use	6	10	\$18,373,402	\$18,373,402	\$36,746,804	\$9,186,701	
Residential	632	684	\$220,130,395	\$110,065,198	\$330,195,593	\$82,548,898	
Total	722	804	\$364,374,198	\$281,578,730	\$645,952,928	\$161,488,232	2%

Source: Wood analysis with Jefferson County Assessor's Data

Figure A-7 City of Arvada FEMA Flood Hazard Areas



- FEMA Flood Hazards**
- 1% Annual Chance
 - 0.2% Annual Chance
 - Streams
 - Lakes



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

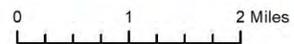
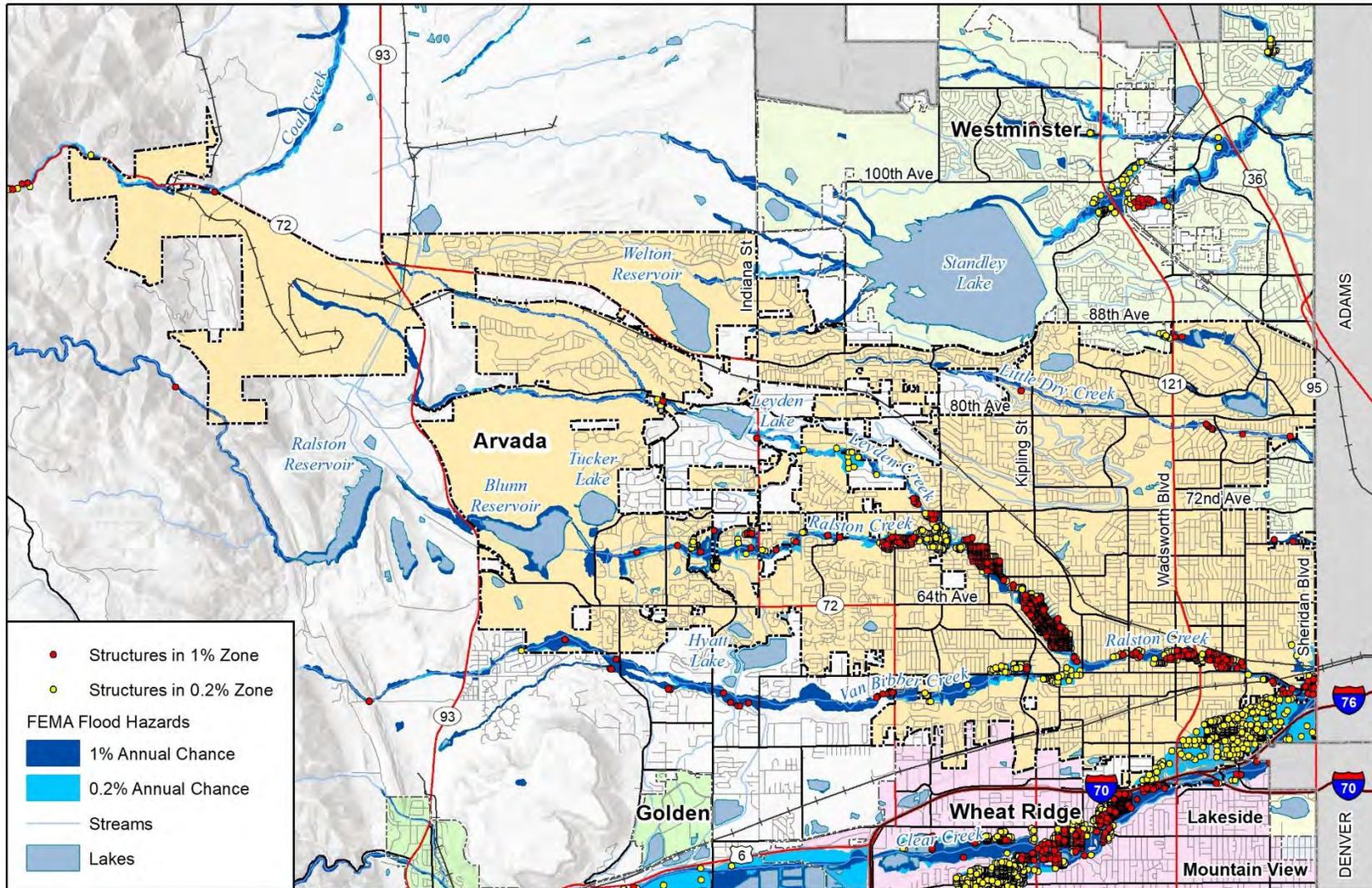


Figure A-8 Properties at Risk of Flooding



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

0 1 2 Miles



Critical Facilities

There are 35 critical facilities in the 1% annual chance flood zone, 30 of which are bridges (Table A-19). The analysis also showed that there are an additional 23 additional critical facilities in the 0.2% annual chance flood zone (Table A-20).

Table A-19 Arvada Critical Facilities in 1% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	4
Hazardous Material	Tier II	1
Transportation	Bridge	30
Total		35

Source: HIFLD and CERC

Table A-20 Arvada Critical Facilities in 0.2% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	4
Hazardous Material	Tier II	4
Health and Medical	Nursing Home	1
Safety and Security	School	2
Transportation	Bridge	12
Total		23

Source: HIFLD and CERC

National Flood Insurance Program

The City of Arvada has participated in the National Flood Insurance Program (NFIP) since 1972. NFIP insurance data shows that as of January 2021 there are 320 flood insurance policies in force in the City providing \$95,962,300 of coverage. There have been 71 historical claims for flood losses, totaling \$66,412. There are two repetitive loss properties as defined by the NFIP, both single family residences, with a total of 5 losses between them; there are no severe repetitive loss structures. In addition to participating in the NFIP, Arvada is also a Community Rating System (CRS) participant and currently a Class 5 CRS community.

A.5.3 Geologic Hazards

Estimating Potential Losses

Arvada has some exposure to geologic hazards including subsidence and dipping bedrock. Most of these areas are and on the western limits of the City, refer to Figure A-9. The HMPC noted a landslide event occurred in Leyden Rock open space areas in 2020. Additional details of the landslide monitoring, movement, and repairs are available in the Leyden Rock Filing 5 Development Files.

Table A-21 summarizes the parcels and values at risk to subsidence and Table A-22 summarizes the parcels and values at risk to dipping bedrock. Content values are estimated and provided as reference but are not generally at-risk for subsidence or dipping bedrock.

Table A-21 City of Arvada Subsidence Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Exempt	1	1	\$70,047	\$70,047	\$140,094	
Industrial	1	1	\$2,079,284	\$3,118,926	\$5,198,210	
Residential	1,500	1,542	\$648,057,161	\$324,028,581	\$972,085,742	3,824
Total	1,502	1,544	\$650,206,492	\$327,217,554	\$977,424,046	3,824

Source: Wood analysis of Jefferson County GIS and Assessor's Data

Table A-22 City of Arvada Dipping Bedrock Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	2	2	\$1,794,739	\$1,794,739	\$3,589,478	
Industrial	2	2	\$3,290,354	\$4,935,531	\$8,225,885	
Residential	203	205	\$85,422,929	\$42,711,465	\$128,134,394	508
Total	207	209	\$90,508,022	\$49,441,735	\$139,949,757	508

Source: Based on analysis of Jefferson County GIS and Assessor's Data

Critical Facilities

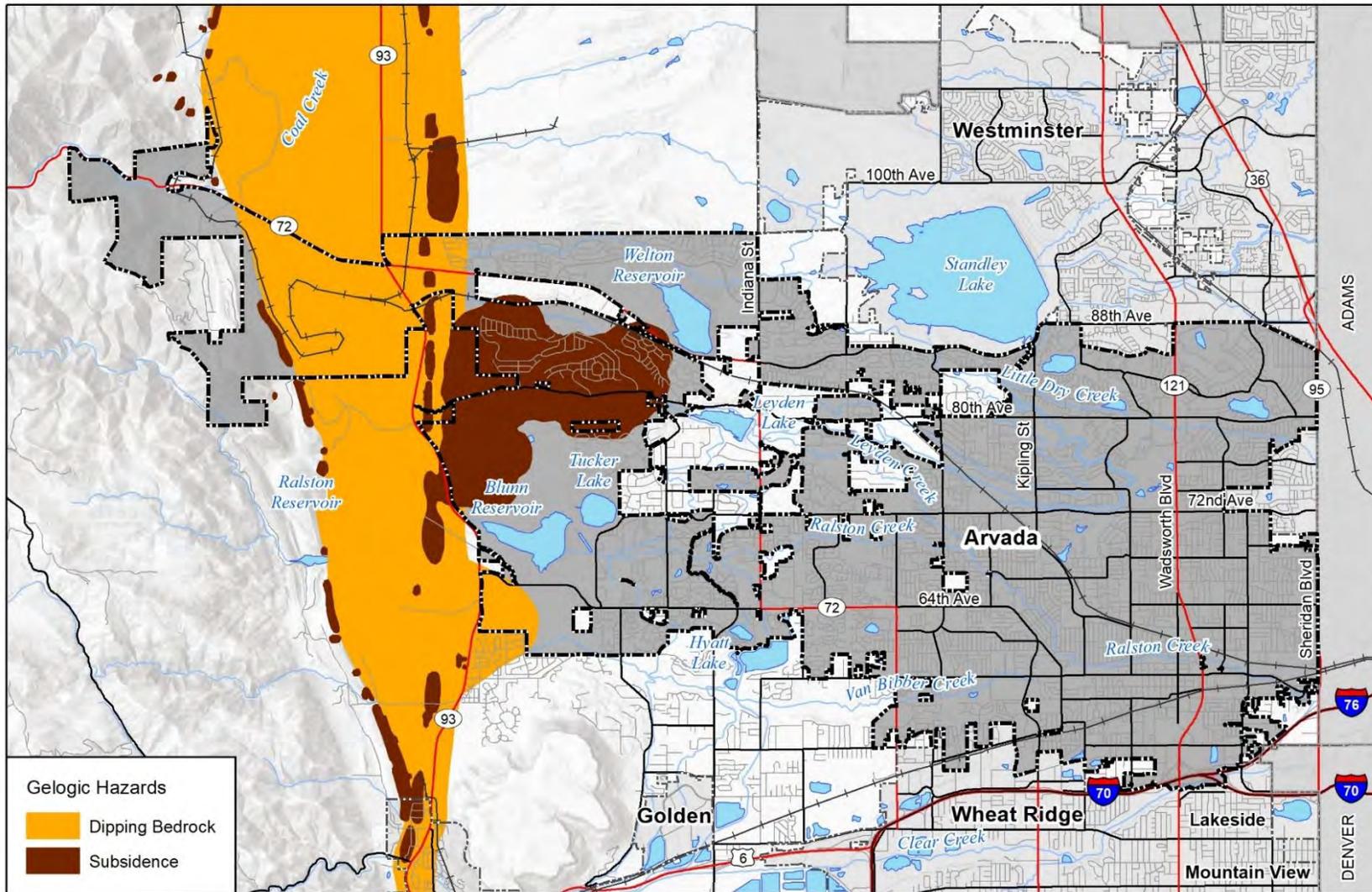
There are seven critical facilities identified in areas at risk of subsidence in the City of Arvada, shown in Table A-23. No critical facilities in the City were identified as being exposed to dipping bedrock hazards.

Table A-23 Critical Facilities Potentially at Risk of Subsidence, by FEMA Lifeline

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	2
	Microwave Service Towers	2
Energy	Electric Substation	2
	Power Plant	1
Total		7

Source: HIFLD and CERC

Figure A-9 City of Arvada Subsidence and Dipping Bedrock Hazards



Geologic Hazards
 Dipping Bedrock
 Subsidence

Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles



A.5.4 Wildfire

While not a foothills community, Arvada does have risk to wildfires, particularly grass fires on the western edge of the City where the wildfire risk is considered to be moderate to high, see Figure A-10.

In 2009, one home was burned by a grassfire in northwest Arvada sparked by a train on the Union Pacific railroad.

Estimating Potential Losses

Parcel analysis was conducted using GIS to analyze where parcels, buildings counts, property types and content values intersected with the wildfire hazards zones defined by the Colorado Forest Atlas, from highest to lowest risk. In addition to parcel data, an address point layer was also used to estimate building locations. Results are shown in Table A-24 - Table A-27. Based on this analysis Arvada is among the cities with the greatest concentration of assets at risk of wildfire. Residential property types have the greatest number of parcels at risk of wildfire, in addition there are 13,553 residents exposed to wildfire risk, a majority of which (6,726) are located in the moderate-risk areas.

Table A-24 High Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	1	2	\$868,042	\$868,042	\$1,736,084	
Residential	348	348	\$155,141,405	\$77,570,703	\$232,712,108	863
Total	349	350	\$156,009,447	\$78,438,745	\$234,448,192	863

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table A-25 Moderate Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	4	4	\$1,912,149	\$1,912,149	\$3,824,298	
Exempt	1	1	\$70,047	\$70,047	\$140,094	
Industrial	2	2	\$3,290,354	\$4,935,531	\$8,225,885	
Mixed Use	2	2	\$13,846,120	\$13,846,120	\$27,692,240	
Residential	2,665	2,712	\$1,147,876,744	\$573,938,372	\$1,721,815,116	6726
Total	2,674	2,721	\$1,166,995,414	\$594,702,219	\$1,761,697,633	6,726

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table A-26 Low Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	3	4	\$2,157,808	\$2,157,808	\$4,315,616	
Residential	356	368	\$151,212,773	\$75,606,387	\$226,819,160	913
Total	359	372	\$153,370,581	\$77,764,195	\$231,134,776	913

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table A-27 Lowest Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	26	37	\$34,459,843	\$34,459,843	\$68,919,686	
Exempt	12	13	\$48,541,684	\$48,541,684	\$97,083,368	
Industrial	18	18	\$11,336,844	\$17,005,266	\$28,342,110	

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Mixed Use	2	2	\$2,045,321	\$2,045,321	\$4,090,642	
Residential	1,918	2,037	\$1,069,895,868	\$534,947,934	\$1,604,843,802	5,052
Total	1,976	2,107	\$1,166,279,560	\$637,000,048	\$1,803,279,608	5,052

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Critical Facilities

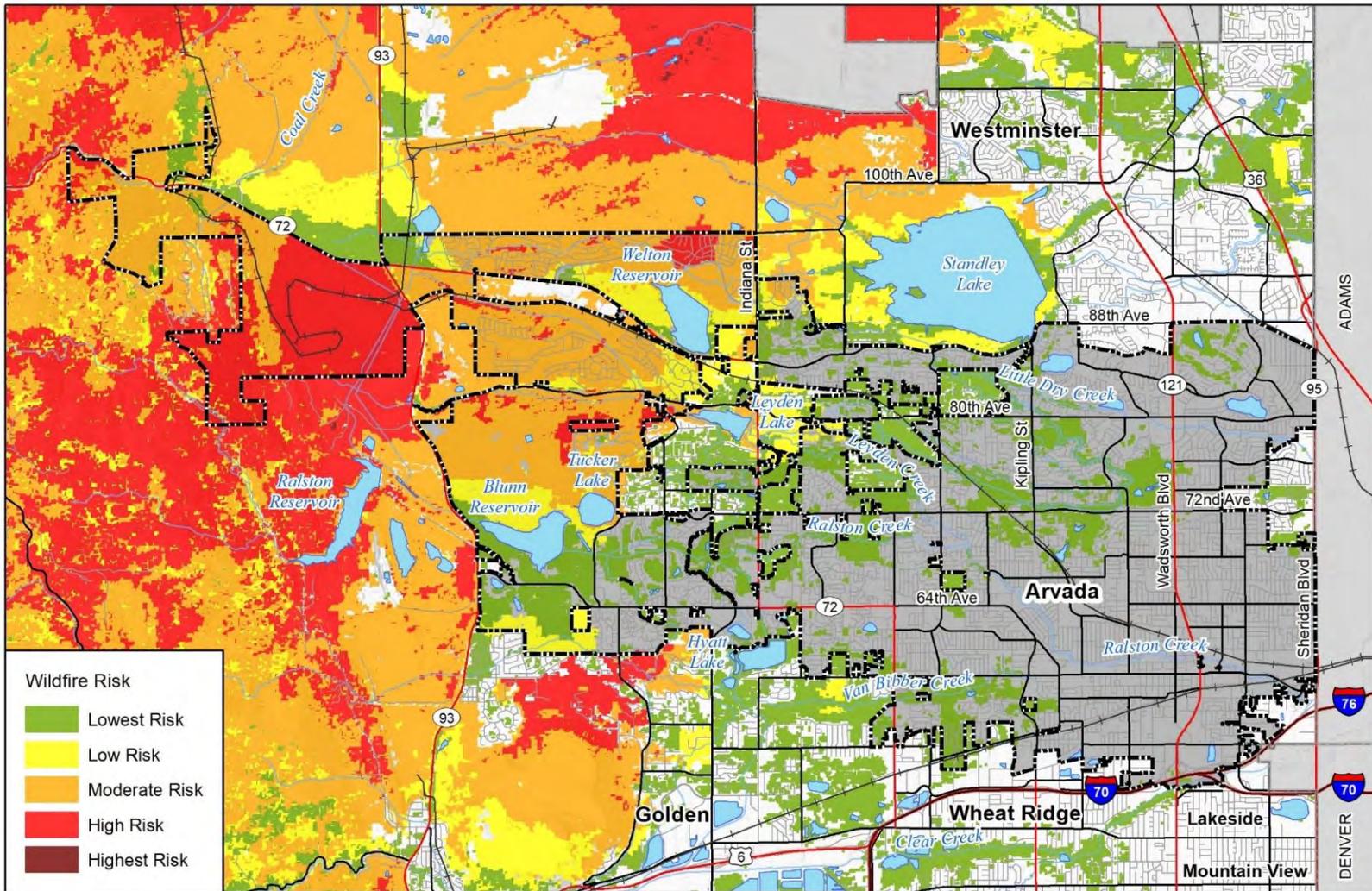
The City of Arvada has a total of 31 critical facilities at risk to wildfire, most of which are within the lowest to moderate wildfire risk areas. The following table shows the results of the GIS analysis and is organized by wildfire risk and FEMA Lifeline. Refer to section 4.3.16 of the Base Plan for more information on the methodology of the GIS analysis.

Table A-28 City of Arvada Critical Facilities At-Risk to Wildfire by Type

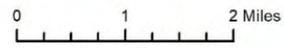
Wildfire Risk	FEMA Lifeline	Critical Facility Type	Count
High	Communications	Land Mobile Private Towers	1
Moderate	Communications	Cellular	1
		Land Mobile Private Towers	4
	Energy	Electric Substation	3
		Power Plant	2
	Hazardous Materials	Tier II	1
	Safety and Security	School	1
Low	Communications	Microwave Service Towers	2
	Hazardous Material	Tier II	1
Lowest	Communications	Land Mobile Private Towers	7
	Health and Medical	Nursing Home	6
	Safety and Security	Fire Station	1
	Transportation	Bridge	1
Total			31

Source: HIFLD and CERC

Figure A-10 City of Arvada Wildfire Risk



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado State Forest Service CO-WRAP



A.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado, and windstorm the entire building inventory and population in the City is potentially exposed. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

Through the Plan Update Guide, the City of Arvada noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Jefferson County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction.

The following are past events noted by the HMPC.

March 2003 Blizzard

A very moist, intense, and slow-moving Pacific storm system made its way across the four corners area and into southeastern Colorado from March 17th to the 19th, allowing for a deep easterly upslope flow to form along the Front Range. Up to three feet of wet snow accumulated in Arvada. 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. Power outages struck homeowners for approximately 24 hours in some parts of the city. Some roads were impassable for up to 48 hours. The City of Arvada was given FEMA reimbursement for snow removal operations in the amount of \$81,022.48.

December 2006 Blizzards

Back-to-back blizzards struck the city a week apart in late December of 2006. The first blizzard, on December 20, struck as a result of a slow-moving low-pressure system that moved from the Desert Southwest into Southeastern Colorado. As a result, a deep upslope flow developed along the Front Range and Northeast Plains of Colorado. One to two feet of snow were recorded. On December 28, another slow-moving storm system moved from the Desert Southwest and into the Texas Panhandle. As it did, a deep easterly upslope flow occurred along the Front Range, with blizzard conditions developing over portions of the Northeast Plains of Colorado, mainly south of Interstate 76. The heaviest snow fell along east facing slopes of the Front Range with storm totals up to 2 1/2 feet in the North Central Mountains and Front Range Foothills. Some roads in Arvada were impassable for up to 48 hours. The City of Arvada was given FEMA reimbursement for snow removal operations in the amount of \$135,759.

May 8, 2017 Hailstorm

Hail the size of 2.75 inches fell in Arvada and the surrounding areas during rush hour. The hail event impacted the entire Denver metro area. In total for the metro area there were 50,000 homeowner claims and 150,000 auto insurance. The Rocky Mountain Insurance Information Association estimates the entire event resulted in \$1.4 Billion in property losses.

COVID-19 Pandemic

The COVID-19 or novel coronavirus pandemic began in December 2019 and was declared a pandemic in March of 2020. The City of Arvada declared a local state of emergency on March 13, 2020 and activated the Emergency Operations Center (EOC). As of January 28, 2021, 147 residents of Arvada have died from COVID-19. The business and economic impacts have been extensive. The City has operated a rent/mortgage relief programs as well as business grants and utility service assistance to residents to alleviate the economic impacts of the pandemic. In 2020, schools were closed and moved to remote learning for the remainder of the 2020 school year and into 2021. On March 27, 2021 Congress passed the Coronavirus Aid, Relief and Economic Security (CARES) Act which authorized the allocation of over \$2 trillion in economic relief for families, small businesses and state and local governments. The City of Arvada has received a total allocation of funding of \$9454,746 from both Counties it is part of (Jefferson County: \$9,211,753 allocated. Adams County: \$242,993 allocated).

A.6 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. Arvada's regulatory, administrative, and technical, and fiscal mitigation capabilities are summarized in Section 2.7 of the Base Plan. Additional details on specific capabilities are discussed below.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

City of Arvada Comprehensive Plan 2014

The City's comprehensive plan is a guide to help the City make decisions and establish its future direction. The goals and policies contained within the plan cover a broad range of subjects related to services, issues, and geographic areas within Arvada. Combined, these elements serve to direct future policy decisions to preserve vital community attributes and service levels and manage growth.

The following excerpts are goals and related policies that are relevant to this hazard mitigation plan.

Land Use and Redevelopment

- Goal L-1: Coordinate Arvada's planning internally and with that of adjacent jurisdictions and the Denver Regional Council of Governments (DRCOG).
 - L-1.1: Coordination with regional planning. Arvada will coordinate with Denver Regional Council of Governments (DRCOG) in implementing its Metro Vision Plan and regional initiatives.

Community Character, Urban Design and Historic Preservation

- Goal CC-2: Establish and maintain Arvada's distinct qualities and small-town identity.
 - CC-2.2: The City will promote high quality architecture, site planning, landscaping, signage, and lighting for new residential and commercial developments.
 - CC-3.3: Transitions for stable rural development. Place open space, trails, riparian and wildlife corridors, view corridors, wetlands, or landscaped buffers between developments.
 - CC-4.1/4: Historic preservation programs. The City will expand outreach and promotion of its historic preservation efforts including the use of the Olde Town Design Guidelines.

Transportation

- Goal T-4: Develop the transportation system in a manner that maintains the quality of life for residents and visitors.
 - T-4.5: Air Quality. The City will consider the impacts that transportation decisions have on ozone-forming emissions and other pollutants in making transportation investments.

Neighborhoods and Housing

- Goal N-3: Maintain and improve the quality of the existing housing stock in Arvada and revitalize the physical and social fabric of neighborhoods that are in decline.
 - N-3.2: Improve Infrastructure in Older Neighborhoods. The City will analyze blighted conditions and invest in infrastructure, to the extent that funds are available.

Resource Conservation and Environment

- Goal R-1: Minimize the impact of new development on natural areas to allow continued cohabitation of people and wildlife.
 - R-1.1: Buffers and Setbacks. The City will require new developments to provide buffers for creeks, water bodies, existing wetlands, riparian areas, and wildlife corridors to retain water quality and environmental integrity.

- R-1.2: Land Use and Infrastructure Decisions. All decisions involving infrastructure and land use should be reviewed in light of a changing climate that may have different and more erratic precipitation trends.
- Goal R-2: Promote improved water quality in stream corridors.
 - R-2.1: Water Quality Features. The City will require water quality features in new developments to minimize degradation of stream water quality.
 - R-2.2: Water Quality Education. The City will educate the public about how they can assist in water quality efforts.
 - R-2.3: Best Management Practices for Stormwater Conveyance. The City will protect water quality through implementation of Best Management Practices in the design of stormwater conveyance and detention facilities.
- Goal R-3: Improve flood control.
 - R-3.1: Flood Control Program. The City will continue to improve the flood control and drainage program to remove properties from the 100 year floodplain.
- Goal R-5: Conserve water resources.
 - R-5.1: Water-Wise Landscaping Examine changes to the Land Development Code to further increase the use of water-wise landscaping and to ensure that plans were built and are operating to specifications.

Parks, Recreation and Open Space

- Goal P-1: Provide strategically placed parks, recreation centers, a well-connected trail system, and preserved open space to serve Arvada residents and visitors.
 - P-1.1: Parks and Open Space Master Plan. The Parks and Open Space Master Plan is part of the Comprehensive Plan. The City will continue to implement the Parks and Open Space Master Plan, as updated periodically.
- Goal P-3: Conserve and maintain important open space lands in and around Arvada to help define the character of the community.
 - P-3.1: Expanded and Maintained Open Space. The City will continue to expand and maintain the open space system. Open space will consist of park preserves, natural areas, and special resource areas as defined in the Open Space Master Plan.
- Goal P-4: Develop parks, trails, and outdoor recreational facilities in an environmentally sensitive manner to help protect and enhance the natural environment.
 - P-4.1: Include Natural Features in Parks. The City will develop new and existing parks and open space lands that include a wide range of natural features.\
 - P-4.2: Natural and Drought-Tolerant Landscape. The City will promote and educate the public about the use of xeriscape and “water-wise” landscaping for new parks. The City will also use drought-tolerant landscape materials and convert non-drought tolerant landscape turf wherever possible.

Public Safety

- Goal PS-1: Provide police services and facilities to meet the needs of Arvada residents and the business community.
 - PS-1.3: Refine and Improve Service Delivery. Continue the move to decentralized service delivery to better connect public safety services with communities of interest.

Utilities and Public Facilities

- Goal U-2: Ensure that adequate public facilities and utilities are available at the time of development, or within a reasonable period, as stipulated by the City, to serve new growth.
 - U-2.1: Timing of Development Arvada will phase and locate future residential, commercial, and industrial growth in coordination with the City's ability to efficiently provide necessary services and utilities including but not limited to water and sewer, storm sewer, transportation, parks, and public safety.

Municipal Code

Article 4-1-2: Floodplain Regulations

This Section 6.13 is intended to provide the means and the guidelines to promote the public health, safety, and general welfare, to minimize public and private losses in areas subject to flood hazards, and to promote wise use of the Floodplain. This Section has been established with the following purposes intended:

- To reduce the hazards of flood to human life, health, and property;
- To protect floodplain occupants from a flood which is or may be caused by their own, or other land use;
- To protect the public from the burden of avoidable financial expenditures for flood control and relief
- To protect the storage capacity of floodplains and to assure retention of sufficient floodway areas;
- To protect the hydraulic characteristics of the small watercourses, including gulches, sloughs and artificial water channels used for conveying flood waters; and
- To protect individuals from purchasing floodplain lands for purposes which are not, in fact, suitable.

In order to accomplish its purposes, this Section includes methods and provisions for:

- Restricting or prohibiting uses which are dangerous to public life, health, or property due to flood waters or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
- Restricting uses which are particularly susceptible to flood damage;
- Requiring permitted floodplain uses, including public facilities which serve such uses, to be protected against floods by flood-proofing and providing general flood protection at the time of initial construction or reconstruction;
- Regulating the manner in which a structure, may be constructed in floodplain areas.
- Regulating the method of construction of water supply and sanitation systems so as to prevent disease, contamination, and unsanitary conditions;
- Delineating and describing areas that could be inundated by floods;
- Regulating the method of construction and pattern of development within all uses in the floodplain;
- Regulating the alteration of natural floodplains, stream channels and natural protective barriers which help accommodate or channel flood waters;
- Regulating or prohibiting filling, grading, development, dredging and unnecessary encroachments which may increase flood damage or prevent water carrying capacity;
- Encouraging uses such as greenbelt, open space, agricultural, recreation facilities and riding trails in floodplain areas.

Flood zone district regulations.

The Flood Zone District represents the area that is inundated in the 100-year flood that may serve as a temporary storage area for the flood waters and that lies landward of the floodway.

Special Provisions

1. No fill, structure, deposit, or other floodplain uses shall be permitted that adversely affects the efficiency of any channels or floodways of any tributaries to the mainstream or river; drainage ditches; or any other drainage facilities or systems.

2. If a property has been issued a Letter of Map Revision based on Fill (LOMR-F) from FEMA the property has been filled so as to remove it from the floodplain, no building permit shall be issued for a new structure to be constructed that would result in a finished floor elevation to be below the previously existing base flood elevation.
3. Residential Construction.
 - a. New construction and substantial improvement of any residential structure within or moved into the Flood Zone District, shall have the lowest floor (including basement), constructed at or above a point two (2) feet above the base flood elevation, or, if within Flood Zone AO, at or above a point three (3) feet above the depth number specified in feet on the Official Floodplain Maps (the depth number shall be at least two (2) feet if it is not specified on the maps). A residential structure shall be any structure which is designed for human habitation.
4. Nonresidential Construction. New construction and substantial improvements of any commercial, industrial, or other non-residential structure within or moved into the Flood Zone District shall either:
 - a. Have the lowest floor (including basement) constructed at or above the Flood Protection Elevation, or if within Flood Zone AO, at least one foot above the depth number specified in feet on the Official Floodplain Map (at least three feet if no depth number is specified); or
 - b. Together with attendant utility and sanitary facilities shall:
 - i. be flood-proofed to or above the Flood Protection Elevation; such that the structure is watertight with walls substantially impermeable to the passage of water;
 - ii. have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and
 - iii. be certified by a Colorado registered professional engineer that the design and methods of construction are in accordance with accepted standards of practice for meeting the provisions of this paragraph. Such certifications shall be provided to the Floodplain Administrator as set forth in §2.5.2.D.1 (Obtain and Maintain Floodplain Information).
5. Critical Facilities. New construction and substantial improvements of any facility classified as a critical facility within or moved into the Flood Zone District shall have the lowest floor (including basement) constructed at or above a point two (2) feet above the base flood elevation.
6. Manufactured Homes.
 - a. Manufactured homes shall be anchored in accordance with §6.13.4.A (Anchoring)
7. All recreational vehicles shall either:
 - a. Be on the site for fewer than 180 consecutive days;
8. The storage or processing of materials that are buoyant, flammable, explosive, or in times of flooding, could be injurious to human, animal, or plant life, shall be at or above a point two (2) feet above the base flood elevation for a particular area, or adequately flood-proofed in accordance with provisions in this Section.
9. Building plans for any project or construction within the Flood Zone District must be submitted to the Floodplain Administrator, for approval, in accordance with [§3.16](#) (Floodplain Development Permit), to insure that said project or construction will not adversely affect the Flood Regulatory District.
10. Any structure permitted in the Flood Zone District pursuant to this Section shall be firmly anchored to prevent the structure or building from floating away thus threatening to further restrict bridge openings and other restricted sections of the stream or river.
 - a. Permitted Uses. Any uses permitted by the underlying Zoning District, in conformance with the preceding Special Provisions, may be permitted by the Floodplain Administrator, subject to the following conditions:

- i. If the Floodplain Administrator disallows a requested use through a Floodplain Development Permit, that is permitted in the underlying Zoning district, the applicant may follow the procedures outlined in § 3.21 (Floodplain Variance) or § 3.2.3 (Appeals).
- ii. The Floodplain Administrator may also require the applicant to follow procedure outlined in § 3.16 (Floodplain Development Permit) for certain uses in the Flood Zone District when said action appears to be in the public interest, and where the health, safety, and welfare of the public may be in question.

Other Regulations

- **Article 2-1-3 Parks and Open Space** and Residential Districts – This section addresses the character and design of those portions of the Standard Zoning Districts, PUD Zoning Districts, the CC Subdistricts, and the NC Subdistricts that are not occupied by platted lots or streets and that are reserved for parks, trails, landscaping, and open space uses. It does not address park and open space dedication requirements, which are described in detail in [§ 7.11](#) (Public Park and Trail Dedications). The requirements of this Section apply regardless of whether or not the land involved will be dedicated to Arvada, and regardless of whether or not such open space will be open to the public or to other residents of the development. For purposes of complying with the requirements of this Code, (a) driveways, sidewalks, parking areas, and designated outdoor storage areas shall not be counted as common open space, (b) land occupied by active recreational uses such as pools, playgrounds, tennis courts, jogging trails, and clubhouses used primarily for recreational purposes, may be counted as open space.
- **Article 4-1-3 Stormwater Drainage Control** – Requirements for stormwater drainage in this article shall apply to all land in the City, except lands on which an approved subdivision plat existed within the City prior to January 1, 1971, that are improved or can be improved without a development plan or plat required by this Code. Requirements for erosion control shall apply to all parcels within the City. At a minimum, reasonable efforts to prevent, mitigate, and control accelerated soil erosion shall include the design, installation, and implementation or temporary erosion control measures prior to any earth disturbance activities.
- **Article 4-1-4 Natural Hazards and Environmentally-Sensitive Areas** – This section applies to new construction. Specifies specific areas of a subdivision known as “Limits of Development” where development activity shall be contained in order to avoid areas due to natural or geologic hazards, soil conditions or floodplains. This section also defines significant natural features including areas that provide groundwater recharge, steep slopes, unstable slopes and other hazards include flooding “or other natural or man-made hazards”. This section also includes guidelines on ridgeline protection, which are identified through the development review process and may require residential dwellings to reduce in bulk or massing while also maintaining existing on-lot vegetation.
- **Article 4-1-6 Construction Activities** – This section of municipal code details the steps required to mitigate erosion, siltation, and dust during periods of construction. It also details how and what construction materials must be recycled.
- **Article 4-2 Subdivision Regulations and Improvements** - These regulations are enacted for the purposes of promoting the health, safety, convenience, order, prosperity, and welfare of the present and future inhabitants of the City of Arvada; for adequate and convenient open spaces for traffic, utilities, access of firefighting apparatus, recreation, light, air, and solar access; and for the avoidance of congestion of population, and other public requirements. Includes regulations on cluster subdivisions.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

2016 Imagine Arvada Parks, Trails, and Open Space Master Plan (Master Plan)

The City never had a formal open space plan before the 2001 Master Plan. The 2016 update provides new recommendations to be completed over the next 10 years. The primary goals of the 2016 Master Plan update “is to ensure the City’s parks, trails and open space meet the needs of a growing community

and encourage outdoor recreation and wellness of Arvada residents. The Master Plan defines policies and projects for the next ten years. The Parks, Trails, and Open Space Master Plan is a functional plan that covers the entire City. Arvada has many trail systems and parks in flood hazard areas, which is an appropriate and wise use of floodplain land. Examples of this are the Ralston Creek and Van Bibber Creek bike trails and neighborhood parks located along these drainages.

2020-2025 City Council Strategic Plan

The following is identified in the City Council Strategic Plan as a priority: “Supports a resilient workforce and community that are able to withstand stresses and shocks, while maintaining essential functions and recovering quickly, effectively, and equitably.” This mandates the following strategic result: By December 2023, launch a citywide resilience collaborative sharing resources, building partnerships and ensuring community ownership of meeting identified resilience targets.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

Arvada Police Department Strategic Plan (Strategic Plan) (2003-2007)

The Arvada Police Department Strategic Plan assists the Police Department with accomplishing its mission, which is: “to provide high quality police service in an objective and professional manner.” The Strategic Plan is for police service for the entire Arvada community. It includes a vision statement and a series of goals and targets.

Arvada Fire Protection District Strategic Plan 2015-2020

The Arvada Fire Protection District Strategic Plan is developed to provide the guidance and vision for the current and future delivery of essential emergency services to the Fire District’s coverage area. Refer to the Arvada Fire Protection District’s Annex for additional information on the Strategic Plan.

Flood Protection Handbook 2010

This is a publicly available plan that helps Arvada residents with personal flood preparedness and management in case of emergency/flood event. It provides mitigation actions as well as adaptation suggestions along with information on flood assistance programs at the local and federal levels.

Post-Flood Recovery Assistance Plan

The City is in the process of updating this plan, which outlines short and long-term recovery roles and responsibilities in the event of a flood. The opportunities for pre and post-flood mitigation are also discussed.

Disaster Recovery Plan

The City’s Disaster Recovery Plan is a “living”, all-hazards plan that focuses on the whole community. The plan provides a framework for the City, its residents and stakeholders “to recover effectively and efficiently from a disaster”. The Recovery Plan is a guide for the City to use during recovery operations and recognizes no two disasters are alike and approached the development of the plan as a “single, comprehensive framework that is scalable, flexible and adaptable” (City of Arvada). The plan establishes the organization of recovery activities including the roles and responsibilities of different City staff involved in the recovery process.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

- Van Bibber Flood Control Project
- Ralston Creek and Van Bibber Creek confluence flood control projects.
- Garrison Bridge and Ralston Creek and re-channelization.

The City has received approval to use funding from the Mile High Flood District to design and construct drainage improvements identified in the recent Leyden Creek Master Plan Update. This plan was completed after the 2013 flood to identify and prioritize capital drainage improvements on the Leyden Creek drainageway. The stakeholders have not secured funding for this project. Therefore, the improvements are still in the planning phase. A revised schedule will be developed when Arvada and the other stakeholders can secure a funding source.

2019- 2028 Capital Improvement Plan

The City's Capital Improvement Plan (CIP) is a comprehensive plan of long-term projects, "for the City's capital maintenance and capital investments for the next decade" (City of Arvada 2019). The CIP covers a variety of capital projects including transportation, facilities, parks, golf, hospitality, water, wastewater and stormwater. The following project highlights are listed under the water and stormwater sections and relate to drought, wildfire, and flood mitigation. Refer to the City of Arvada 2019-2028 Capital Improvement Plan for complete descriptions of each project.

Water

"The Water utility remains on the cusp of the most regionally transformational project to which the City is a party besides the G Line" (City of Arvada 2019).

- Gross Reservoir Expansion: Will substantially increase the availability of water for the City, ensuring stable and adequate supply for decades to come.
- Water System Replacement: Prioritize pipeline replacement based upon leak history, age and other known factors about condition of pipeline. Funding will be from water rates.
- Denver Water Moffat Project Participation: A financial partnership with Denver Water on the expansion of Denver Water's Moffat system. Will result in additional water supplies to meet the needs of the current and future residents. Funding will be from Water Tap Fee Revenues.
- Ralston Water Treatment Plan Pump Station: Water pump station will provide water to the northwest portion of Arvada. Funding will be from Water Tap Fee Revenues.
- Coal Creek 1.5 Million Gallon Water Tank and Pipeline: Installation of a potable water tank at the intersection of Hwy 93 and Hwy 72. This project will provide additional fire protection to the northwest section of Arvada including the Candelas and Leyden Rock subdivision. Funding will be from Water Tap Fee Revenues.

Stormwater

"Major plans include improvements along many points of Leyden Creek and various outfall improvements aimed at mitigating potential threats of flash flooding and property damage" (City of Arvada 2019).

- Flood Recovery: The September 2013 resulted in substantial damage to stream banks and other drainage infrastructure in the Ralston Creek, Leyden Creek, and Little Dry Creek drainageways. This project will fund repairs to banks and waterway infrastructure, studies conducted jointly with the Mile High Flood District and Jefferson County to determine how the stormwater flowed and what infrastructure improvements are needed. Funding will be from Stormwater Utilities Fee revenue.
- Bates Lake Watershed Drainage Improvements: Primary aim is to reduce property damage caused by flooding events. Multi-phased project to rebuild the outlet works for Bakes Lake Detention area, upsize an existing stormwater pipe and expand the stormwater conveyance system along Sheridan Boulevard from 62nd Ave. to Clear Creek.
- Yankee Doodle Outfall Systems – Pond Enlargement: Additional capacity will reduce the flood risk to the Fremont Elementary School, residences, and commercial businesses. Funding will be through Stormwater Fund Fee revenue. Financial participation with Mile High Flood District will be solicited.
- Leyden Creek Crossing at Croke Canal: During the 2013 Flood, the Croke Canal was purposely breached at this location to prevent flood water in the canal from over topping downstream and damaging properties. Will keep stormwater up to and including the 100-year flood flows on Leyden Creek from entering the Croke Canal and limits flows in the canal to its design capacity. Project is related to a recommendation in the Leyden Creek Drainageway Master Plan Update.
- Leyden Creek Crossing at W. 82nd Avenue aka Leyden Road: Replaces culverts to convey 100-year flood under W. 82nd Ave. Also includes upstream and downstream channel improvements. W. 82nd

Avenue closes when water crosses over it to prevent vehicles from being washed away. When closed, only allow in and out access for residents and emergency vehicles of Leyden Rock and Leyden Ranch West developments is through W. 80th Ave. and Indiana St. intersection.

- Ralston Creek at Croke Canal Crossing: Result of 2013 Flood flows that entered the Croke Canal. Will collect and direct flood flows in the Ralston Creek upstream of the Croke Canal to the existing 100-year crossing structure at Ralston Creek and the Croke Canal.
- Ralston Creek Improvements – Vance Street to Wadsworth By-Pass: Remove +/- 20 residential properties in the 100-year floodplain along Ralston Creek from upstream of Vance Street to Wadsworth By-Pass. Neighborhood is adjacent to Olde Town and with the opening of RTD's G Line, it will be difficult for those properties in the floodplain to reach their full redevelopment potential.
- Moon Gulch – Smith Property Detention Pond: Joint project with CDOT and Mile High Flood District. During the 2013 Flood the pond overflowed, and flood waters entered the Croke Canal. Will replace current drainage pipe under Indiana Street and Croke Canal.
- Tennyson Street Outfall: Outfall needs to be constructed to reduce flooding that occurs to commercial properties at W. 58th Ave. and Tennyson St. and south along Tennyson St.
- UDFCD (Mile High Flood District) Master Plan Studies and Joint Maintenance Projects
- Stormwater Master Plan: Fund an update to the Master Plan that was last updated in 1986.

Public Information

Public involvement includes a spectrum of activities, from informing residents, property owners, potential property owners, and visitors about hazards, ways to protect people and property, and the natural and beneficial functions of natural resources (e.g., local floodplains), to engaging the community to learn about new opportunities to mitigate risks and better understand knowledge gaps.

The City of Arvada's communications and engagement strategy is implemented by a cross section of City employees responsible for public information and engagement and is led by the City Manager's Office's Communications Team. The Chief Communications Manager leads that team, serves as the lead communications official for the City and is the interface between the City and all media sources (serving as City PIO). The position also directs Arvada's public television network, KATV Arvada (Channel 8) and oversees the posting of public information on the city's web site, www.arvada.org. The team also distributes hazard-related information across other digital communications channels, including social media and e-newsletters. The City's Police Department PIO is also a member of the Emergency Service Public Information Officers Colorado (ESPIOC).

Hazard awareness information is provided in the monthly Arvada Report, a printed publication that is mailed to every mailing address in Arvada. The City uses an online community engagement platform, called Speak Up Arvada, to periodically gather feedback from the community about hazard mitigation concerns.

Also, the city's Emergency Management Coordinator (EMC) provides public outreach to citizens with hazard awareness and preparedness information and presentations. Hazard awareness information is also posted on the City website and on social media. In addition, the City also acknowledges September as Emergency Preparedness Month and has a communication campaign for the entirety of that month.

Collectively, the City team provides ongoing public outreach through:

- Water bill flyers;
- City website (Arvada.org);
- Public education outreach on emergency planning, hazard awareness, and preparedness;
- Flood Protection Handbook for citizens;
- Employee safety training through Risk Management;
- Periodic messages on other digital channels, including social media and e-newsletters.

Additional Public Outreach Efforts include:

- **Sustain Arvada**
 - Arvada Air Quality –

- Provide guides on steps residents can take to improve air quality in the City.
- Energy Conservation –
 - All major remodels and new City facilities require LEED Silver certification;
 - Traffic signals are being converted to LEDs;
 - Solar panels have been installed at five locations;
 - A 20-acre solar garden is planned with energy that can be sold to residents and businesses in the form of shares.
- Forestry –
 - Parks Department Forestry Division tree assessment now digitized as part of Arvada's Forestry plan for its 13,000 + trees. The Forestry Plan includes strategies for tree diversification, preventative maintenance, spraying and injecting for pests and disease.
 - Arvada has been named a Tree City USA for 30 consecutive years and has celebrated Arbor Day with Peck Elementary for 35 years planting 390 trees together over the years. The City also has a Plant-A-Tree program that allows for Citizens to purchase and plant trees in our Parks. The City has planted over 430 trees with Citizens over the years.
- Water Conservation –
 - Water conservation was introduced as a City goal in the 2005 Comprehensive Plan. Goal reaffirmed in 2014 Plan.
 - 100% of City parks have computerized irrigation systems to conserve water.
 - A partnership with Resource Central
 - Garden in a Box
 - Waterwise Landscape Seminars

- **Resilient Neighborhoods – Resilience-building programs and resources for residents:**

In support of the City's strategic focus on maintaining a vibrant community and neighborhoods and consistent with its overall approach to communication and engagement the City operates the Neighbors Connected program. It is a neighborhood engagement platform designed to connect City of Arvada residents with resources and opportunities that will help them develop sustainable neighborhood groups and strengthen their own communities.

This program integrates with the Community Resilience Coordinator and the City's emergency preparedness and resiliency efforts through several related activities and recommendations to the community:

- Encouraging community members to meet with their Neighbors Connected group to identify a neighborhood emergency contact person and meeting point
- Promoting Severe Weather Spotter training
- Encouraging participation with the Arvada Community Emergency Response Team (Arvada CERT)
- Asking residents to create home preparedness plans and emergency kits with neighbors.
- Providing resources to help neighbors create a "talent bank" to inventory special skills, and asking questions like "Is someone in your neighborhood an EMT or nurse? Can someone speak multiple languages or use a HAM radio?"
- Encouraging neighborhood groups to apply for a Neighborhood Improvement Grant to build a local gathering place with your neighbors.
- Distributing a Flood Risk brochure for residents "What is my flood risk?"

Opportunities for Enhancement

Based on the capability assessment, Arvada has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the City to expand or improve on these policies and programs to further protect the community. The HMPC identified exploring methods for partnering with Arvada Fire on community engagement and outreach efforts to help educate residents on their risk of wildfire hazards. Also, since experiencing the economic impacts of the 2020 COVID-19 pandemic, the

Arvada Economic Development Association is exploring recovery planning educational information for local businesses for the next disaster event so they can be better prepared. Table 2-15 in the Base Plan shows the potential financial benefits from increasing the City's Community Rating System class. Other future improvements may be the incorporation of risk and hazard information into future comprehensive plan updates, the next starting in 2023.

A.7 Plan Implementation and Maintenance

Arvada has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the City will continue public participation in the plan maintenance process.

A.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The City of Arvada recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, the 2016 Hazard Mitigation Plan will be referenced in the City's 2021 Emergency Operations Plan. The floodplain regulations section of the Land Development Code was also updated and adopted in 2020.

A.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Arvada Community Resilience Coordinator, City Manager's Office will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. Arvada Community Resilience Coordinator, City Manager's Office will also be responsible for representing the City on future Jefferson County HMPC meetings, and for coordination with city staff and departments during plan updates. The City, Fire District and Police Department will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the City Council.

The City of Arvada will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

A.8 Mitigation Strategy

The City of Arvada has adopted the hazard mitigation goals and objectives developed by the Planning Team and described in Section 6.2 of the Base Plan.

The City had six mitigation actions in the 2016 Plan, and has completed one of them:

- Multi-Jurisdictional Storm Ready Program Participation

The remaining actions have been carried over into the 2021 Plan, along with eleven new actions.

A.8.1 National Flood Insurance Program

Recognizing the importance of the National Flood Insurance Program (NFIP) in mitigating flood losses, the City of Arvada will place an emphasis on continued compliance with the NFIP. As an NFIP participant, the City has 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 as well as review of any potential development in special flood hazard areas.

A.8.2 Mitigation Actions

The local planning team identified and prioritized the following mitigation actions for the City of Arvada based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation

Table A-29 City of Arvada Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Arvada 1	Leyden Creek Improvements. The 2013 flood inundated homes and private property along Leyden Creek. A drainage master plan has since been completed to identify strategies and drainage improvements to reduce the risk from future floods. Benefits include reduction in flood losses	Flood	2; FWS	City of Arvada Public Works	\$12,000,000 Jefferson County, MHFD, Farmers Reservoir and Irrigation Company, and Arvada	Medium	To be determined	Not Started. The stakeholders have not secured funding for this project. Therefore, the improvements are still in the planning phase. A revised schedule will be developed when Arvada and the other stakeholders can secure a funding source.
Arvada 2	MHFD Master Plan Implementation. In the early 1970s a drainage master plan was generated that identified drainage needs in the city not along the major creeks. Over the years numerous projects have been completed. This project would entail updating the Master Plan and continuing with implementing the master plan improvements.	Flood	2; FWS, H&M, S&S, TRN	City of Arvada Public Works	\$20,000,000 MHFD and City of Arvada	Medium	Anticipated completion in 2021	In Progress. The Storm Drainage Master Plan is currently underway and expected to be complete by Q2 of 2021. Arvada continues to work with the Mile High Flood District on updating Major Drainageway Master Plans and implementing their projects. On-schedule.
Arvada 3	Environmental damage protection. Areas in the northwest and western portions of Arvada are made up of open space, lakes and recreational attributes. These areas are exposed to high winds and blowing snow and precipitation. While wind shields and sandbags are deployed by Arvada Traffic and Transportation Division of Public Works-Maintenance during adverse weather to these key areas, engineered infrastructure investments are necessary for long term solutions. Without a permanent barrier solution to shield properties and roadways, Arvada and Jefferson County residents living	Erosion	2; FWS, H&M, S&S, TRN	City of Arvada – Traffic and Transportation Division of Public Works	The City would need an engineered study on potential alternatives with the highest benefit to cost ratio for consideration. To be determined.	Medium	To be determined and contingent on schedule	Not Started. Continuing to use short term solutions until a more permanent improvement can be funded.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	along this Front Range area as well as the traveling public, will continue to be affected by the rapidly changing weather conditions. This project mitigates impacts from windstorms and winter storms. Benefits include Reduction in soil erosion, transportation accidents, stranded travelers needing shelter during blizzard conditions and road closure, enhanced protection for railway transportation.							
Arvada 4	<p>Road Weather Information System (RWIS). To reduce congestion and enhance roadway operational safety, the City of Arvada is interested in placing data stations on high volume arterials that are most vulnerable to adverse weather conditions and traffic collisions. Data Stations, similar to those operated by CDOT, will provide Street Maintenance and the Transportation Division with information pertaining to traffic flow, pavement condition, and weather temperatures to better manage City resources and communicate with roadway travelers. Each station will be equipped with the following elements:</p> <p>Traffic Cameras: will be used to visually verify traffic incidents, debris/blocked roadways, and pavement surface.</p> <p>Maintenance Decision Support System (MDSS): will be used to notify plow trucks of pavement conditions and determine amount of resources necessary to mitigate ice and snow.</p> <p>Traffic Data Collection Device: used to calculate volumes, speed, and lane occupancy that can be mapped and communicated to the traveling public.</p> <p>Communication Device: fiber or radio</p>	Severe Winter Storms	2: TRN	City of Arvada – Traffic and Transportation Division of Public Works	\$50,000 X 5 (Stations: West 86th Pkwy, West 58th Ave, Kipling Pkwy, West 64th Avenue, and West 72nd Avenue corridors). To be determined	Low	To be determined	Not Started The mitigation project has been deferred until funding becomes available. However, the City team is seeking information to move forward on this project and recently visited Fort Collins to discuss their work.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	<p>connection to TMC and Street Maintenance. Power: photovoltaic equipment and batteries, or metered electric power. Benefits include The City of Arvada manages 1,500 miles of pavement surface. The selected arterial corridors have an AADT higher than 9,000 vehicles and connect Arvada collector streets (neighborhoods) to State Highways in northwest metro area. The City can enhance roadway operations and improve regional trips by monitoring traffic and weather data to reduce the impact of incidents and weather related delays.</p>							
Arvada 5	<p>Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The City of Arvada participates in the National Flood Insurance Program. The city also participates in the Community Rating System and is a CRS Class 5. This project restates the commitment of the City of Arvada to implement sound floodplain management practices, as stated in the floodplain ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated to or above the base flood elevation. This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date. Floodplain managers will remain current on NFIP policies and are encouraged to attend appropriate</p>	Flood	2; FWS, H&M, S&S, TRN	Engineering Division	Low Covered in existing budget	High	Continuing as an ongoing initiative	In Progress Continued as an ongoing initiative.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	<p>training and consider achieving Certified Floodplain Manager (CFM) status. Currently three staff members have their CFM. Other activities that could be included in this effort are:</p> <p>Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance; suggest changes to improve enforcement of and compliance with regulations and programs; participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps; utilize recently completed Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits; promote and disperse information on the benefits of flood insurance, with assistance from partners such as the County, Urban Drainage and Flood Control District, and Colorado Water Conservation Board; evaluate activities that will improve Community Rating System ratings that may further lower the cost of flood insurance for residents.</p>							
Arvada 6	<p>Hazard and Risk Mitigation Public Education and Awareness. City staff to reach out to residents and businesses about emergency preparedness and possible mitigation activities through awareness campaigns, events, public outreach, website, social media, and workshops.</p>	<p>Flood; Wildfire; Extreme Temps; Severe Winter Storms; Drought; Windstorm;</p>	<p>1; 3; S&S; COM;</p>	<p>City of Arvada Office of Emergency Management Arvada Police, Jeffcom 911</p>	<p>Covered in existing budget Covered in existing budget</p>	<p>Medium</p>	<p>Ongoing</p>	<p>New in 2021</p>

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Arvada 7	Alert and Warning Public Education and Awareness (CodeRed). City staff to reach out to residents and businesses about alert and warning through awareness campaigns, events, public outreach, website, social media, and workshops.	Flood; Wildfire; Extreme Temps; Severe Winter Storms; Drought; Windstorm;	1; 3; S&S; COM;	City of Arvada Office of Emergency Management Arvada Police, Jeffcom 911	Covered in existing budget Covered in existing budget	Medium	Annual implementation.	New in 2021
Arvada 8	Partner with Arvada Economic Development Association (AEDA) to foster local business emergency preparedness and hazard mitigation. Engage with the Retention Committee on a regular basis to hear from local businesses. Develop local business preparedness and mitigation toolkit in collaboration with AEDA.	Dam Failure; Drought; Erosion and Deposition; Expansive Soils; Extreme Temps; Flood; Hailstorm; Severe Winter Storms; Wildfire; Windstorm;	1; 3; S&S; COM;	City of Arvada Office of Emergency Management Arvada Economic Development Association	Little to no cost Covered in existing budget	Medium	Annual implementation.	New in 2021
Arvada 9	Continue "Resilient Arvada" partnership. Partnership between staff at the City of Arvada Office of Emergency Management and Neighbors Connected Program to foster emergency preparedness at the neighborhood level (Talent Bank, neighborhood meeting places grants, and more).	Drought; Extreme Temps; Flood; Hailstorm; Severe Winter Storms; Wildfire; Windstorm;	1; 3; S&S; COM;	City of Arvada Office of Emergency Management City of Arvada Neighbors Connected Program	Covered in existing budget Covered in existing budget	Medium	Annual implementation.	New in 2021

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Arvada 10	Develop a CWPP in partnership with Arvada Fire. Both organizations have the goal of developing a CWPP for Arvada. This plan will identify the risks associated with development in the WUI/PUI and the projects that will mitigate the risk. Implementation of the projects is an interest of neighborhood-level groups like HOAs. Though Arvada does not have the highest risk in Jeffco for hazards typically identified in a CWPP, there is absolutely a benefit with understanding our specific risk better and working to minimize it as best we can as the City continues to grow in the PUI and toward the WUI.	Drought; Wildfire; Windstorm;	1; 2; 3; S&S; COM; TRN;	City of Arvada Office of Emergency Management Arvada Fire Protection District	Less than \$10,000 FEMA Hazard Mitigation Grant Programs	High	2026	New in 2021
Arvada 11	Ralston Creek Improvements - Vance Street to Wadsworth By-Pass. The purpose of this project is to remove approximately twenty residential properties in the 100-year floodway along Ralston Creek from just upstream of Vance Street to Wadsworth By-Pass. A detailed solution has not been identified, but it will probably be a combination of channels improvements and purchasing flood prone properties.	Flood;	2; S&S; COM; TRN;	City of Arvada Public Works Engineering Division UDFCD	More than \$10,000,000 MHFD, City of Arvada, Hazard Mitigation Assistance Grants	High	End of 2031	New in 2021
Arvada 12	City Wide Vegetation Management Program. The purpose of this program would be to proactively manage overgrown vegetation and dying trees along open channel drainageways within the City. This effort would restore the channel's roughness coefficients to a comparable value modeled in the Flood Insurance Studies. Additionally, this work would be complemented with tree mitigation efforts at strategic locations throughout the City.	Flood;	2; S&S; COM; TRN;	City of Arvada Public Works Engineering Division	More than \$1,000,000 UDFCD, City of Arvada, Hazard Mitigation Assistance Grants	Medium	End of 2031	New in 2021

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Arvada 13	Ralston Creek at Ward Rd. The purpose of this project is to replace the Ward Road bridge and increase channel capacity. This project was identified in the Ralston Creek US Army Corp Study of 2018 as part of the preferred alternative. The benefits of this project would reduce the floodplain footprint resulting in fewer structures within the regulatory floodplain. Additionally, the improvement would help protect critical water distribution pipes in the area.	Flood;	2; S&S; COM; TRN	City of Arvada Public Works Engineering Division	More than \$1,500,000 MHFD, City of Arvada, Hazard Mitigation Assistance Grants	Medium	2026	New in 2021
Arvada 14	Implement Multi-Year Training and Exercise Plan. The purpose of this project is to implement a multi-year training and exercise plan for the City of Arvada through the Office of Emergency Management. This will increase knowledge and training in disaster response and recovery for subject-matter experts and increase the organization and community's capability to be more resilient. This will include expanded ICS training for personnel as well as an annual tabletop exercise.	Dam Failure; Drought; Erosion and Deposition; Expansive Soils; Extreme Temps; Flood; Hailstorm; Landslides, Debris flows, Rockfalls; Lightning; Severe Winter Storms; Subsidence; Tornado; Wildfire; Windstorm; Cyber; Pandemic;	1; 2; 3; S&S; COM;	City of Arvada Office of Emergency Management Whole City Staff	Less than \$10,000 Covered in existing budget	Medium	Annual implementation.	New in 2021

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Arvada 15	Flood Hazard Public Outreach. The City will implement public information and education projects to increase the community's awareness of flood hazards and safety.	Flood;	1; COM; S&S;	City of Arvada Public Works Engineering Division City of Arvada Office of Emergency Management; City of Arvada Communications	Less than \$10,000 Department budget, FEMA Hazard Mitigation Assistance Grants	Medium	Annual implementation.	New in 2021
Arvada 16	Arvada Fire/City of Arvada Office of Emergency Management Collaboration. Continue partnership with Arvada Fire and other organizations to implement joint neighborhood-level resilience and community risk reduction work. Host workshops with neighborhood leaders to discuss their risks and the strategies for addressing those risks at the neighborhood level. Partner to communicate the importance of signing up for CodeRed emergency notifications. Visit HOA meetings together to discuss risk reduction and mitigation actions individuals and HOAs can take.	Windstorm; Wildfire; Drought;	1; 3; S&S; COM;	City of Arvada Office of Emergency Management Arvada Fire	Covered in existing budget Covered in existing budget	High	Annual implementation.	New in 2021

Annex B. City of Edgewater

B.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The City of Edgewater fully participated in the 2021 update process as described in Section 3. The City had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section B.9. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the City on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

B.2 Community Profile

Figure B-1 shows a map of the City of Edgewater.

B.2.1 History

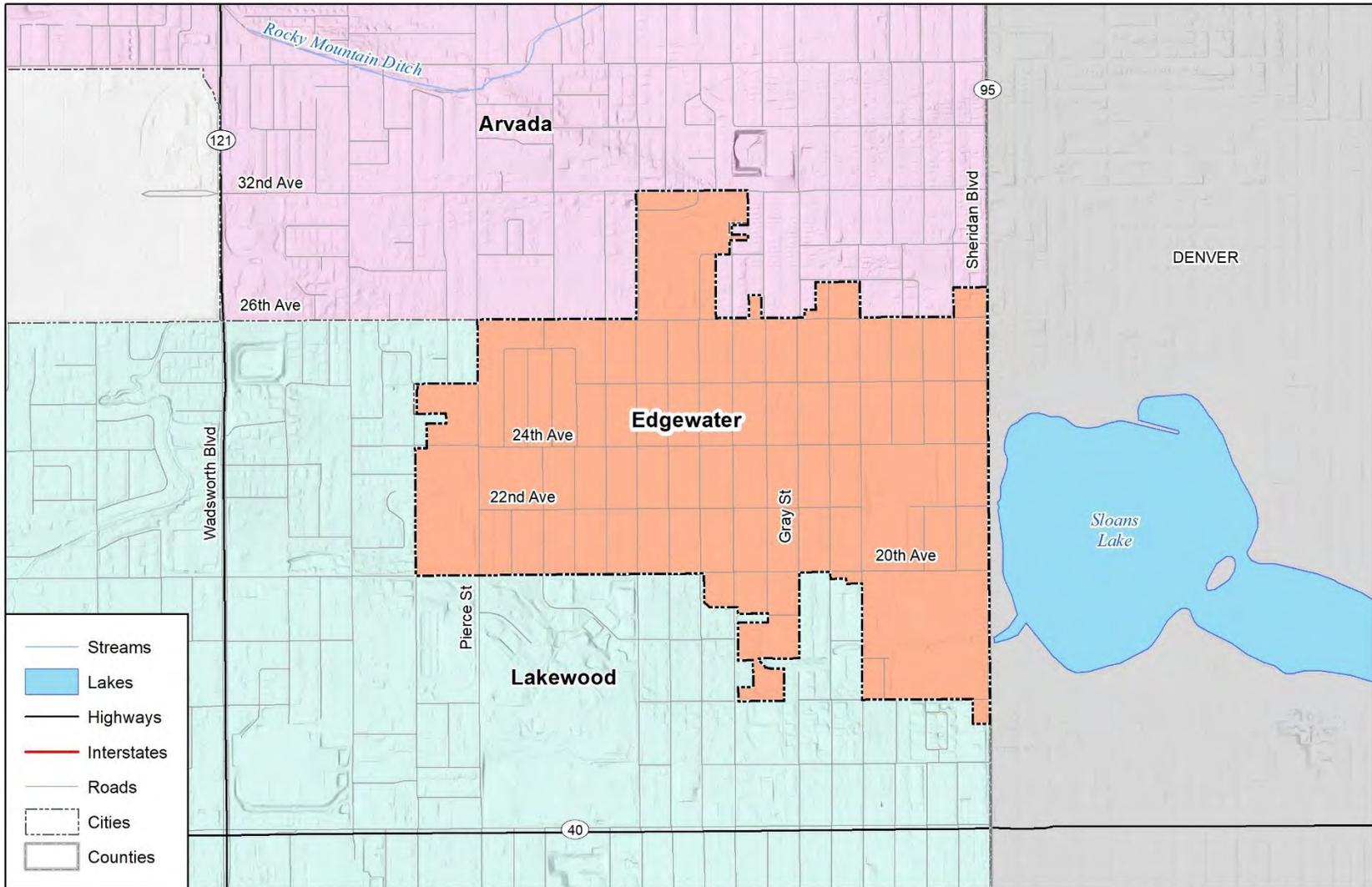
The City of Edgewater is a Home Rule Municipality located in Jefferson County, Colorado, United States. Edgewater is located immediately west of Denver, in the Denver-Aurora-Lakewood, CO Metropolitan Statistical Area. In 1861, Thomas Sloan decided to dig a well on his land in the Colorado Territory. Sloan came to Arapahoe County (now Denver County) with aspirations of farming. The spot he chose was about two miles west of the growing settlement of Denver where he proceeded to dig a well for the irrigation of his farm and tapped into a warm water spring. Overnight his well filled and continued flowing until nearly 200 acres were flooded and the resulting lake became known as Sloan's Lake, the name it bears today.

Ruth Wiberg recounts in [Rediscovering Northwest Denver](#), "Word of the gushing well spread to the fledgling town of Denver. People rode out on horseback to see the phenomenon of farmer Sloan's well and talked as they watched the water spread." George F. Turner, an old stage driver for the C.O.C. & P.P.E., states in the Denver Post (October 20, 1908) that the lake's formation occurred between June 1861 (when he left the area) and early 1863 (when he returned). E. J. Stanton a reputable engineer drove by the Sloan farm and viewed the formation of the lake. Further verification of the lake was by Mayor Sopris and Alderman Gove. They stated they had been out to the lake and saw the well was overflowing.

The area just west of Sloan's Lake soon became known as "Edgewater" due to its close proximity to the lake. At the time, however, there was nothing in the Edgewater area but a few fishing shacks. According to the Western History Department of the Denver Public Library, the county line between Jefferson and Arapahoe Counties (later to become Denver County) became known as Sheridan Boulevard and was developed as a route to Fort Sheridan, which subsequently became known as Fort Logan. In 1887 President Cleveland signed a bill to provide a military post on a tract of land in the Denver area. Eleven sites were approved for the consideration of General Sheridan. The preference of Denverites was a section of land adjacent to Sloan's Lake as it was pointed out it would be easier to "keep away the saloons and other nuisances" if the camp was close to Denver. General Sheridan and his party came to Denver and spent four days touring proposed tracts. His selection was the Johnson Tract, located about eight and half miles from Union Station. At this time, the post was officially labeled "Camp Near the City of Denver", later called Sheridan Post or Fort Sheridan. On April 8, 1889, the post was officially named Fort Logan, which it remains to this day.

Edgewater incorporated as a City on August 17, 1901.

Figure B-1 City of Edgewater



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT



B.2.2 Population

The U. S. Census Bureau's estimated 2019 population of Edgewater was 5,328, a 1.74% increase from 2015. Select Census demographic and social characteristics for Edgewater are shown in Table B-1. The City of Edgewater has a senior citizen complex at Edgewater Plaza.

Table B-1 Edgewater Demographic and Social Characteristics

Edgewater	2015	2019	% Change
Population	5,237	5,328	1.74%
Median Age	32.8	33.6	2.4%
Total Housing Units	2,540	2,607	2.6%
Housing Occupancy Rate	96.7%	95.8%	-0.9%
% of Housing Units with no Vehicles Available	10.4%	8.3%	-20.2%
Median Home Value	\$218,600	\$408,500	86.9%
Unemployment Rate	11.5%	4.8%	-58.3%
Mean Travel Time to Work (minutes)	23.8	22.7	-4.6%
Median Household Income	\$44,148	\$56,028	26.9%
Per Capita Income	\$26,110	\$33,529	28.4%
% of Individuals Below Poverty Level	16.4%	9.6%	-41.5%
% Without Health Insurance	30.2%	11.4%	-62.3%
# of Households	2,456	2,497	1.7%
Average Household Size	2.1	2.1	0.0%
% of Population Over 25 with High School Diploma or Higher	83.2%	91.7%	10.2%
% of Population Over 25 with Bachelor's Degree or Higher	23.7%	35.6%	50.2%
% with Disability	13.5%	13.9%	3.0%
% Speak English less than "Very Well"	10.6%	5.2%	-50.9%

Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Table B-2 Edgewater Demographic & Social Characteristics Compared to the County & State

Demographic & Social Characteristics (as of 2019)	Edgewater	County	Colorado
Median Age	33.6	40.3	36.7
Housing Occupancy Rate	95.8%	96.4%	90.0%
% of Housing Units with no Vehicles Available	8.3%	3.9%	5.1%
Median Home Value	\$408,500	\$397,700	\$343,300
Unemployment	4.8%	3.6%	4.3%
Mean Travel Time to Work (minutes)	22.7	28	25.8
Median Household Income	\$56,028	\$82,986	\$72,331
Per Capita Income	\$33,529	\$44,119	\$38,226
% of Individuals Below Poverty Level	9.6%	7.1%	10.3%
% Without Health Insurance	11.4%	5.5%	7.6%

Demographic & Social Characteristics (as of 2019)	Edgewater	County	Colorado
Average Household Size	2.1	2.40	2.56
% of Population Over 25 with High School Diploma or Higher	91.7%	94.5%	91.7%
% of Population Over 25 with bachelor's degree or Higher	35.6%	45.2%	40.9%
% with Disability	13.9%	10.0%	10.6%
% Speak English less than "Very Well"	5.2%	3.0%	5.8%

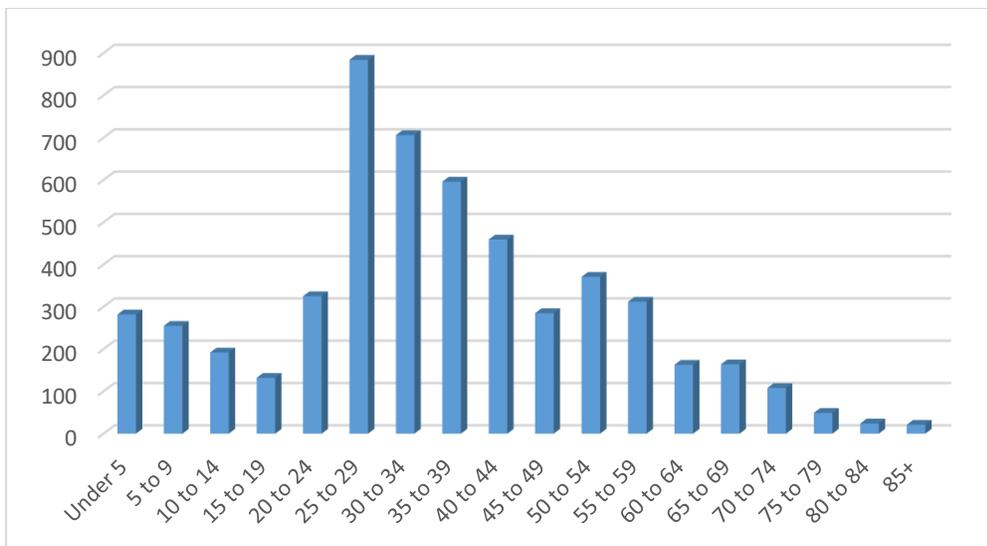
Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Table B-3 Edgewater Demographics by Race and Sex

Edgewater	Population	%
Total Population	5,328	
Male	2,884	54.1%
Female	2,444	45.9%
White, not Hispanic	3,146	59.0%
Hispanic or Latino	1,946	36.5%
Black	140	2.6%
Asian	0	0.0%
American Indian and Alaska Native	21	0.4%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	0	0.0%
Two or more races	75	1.4%

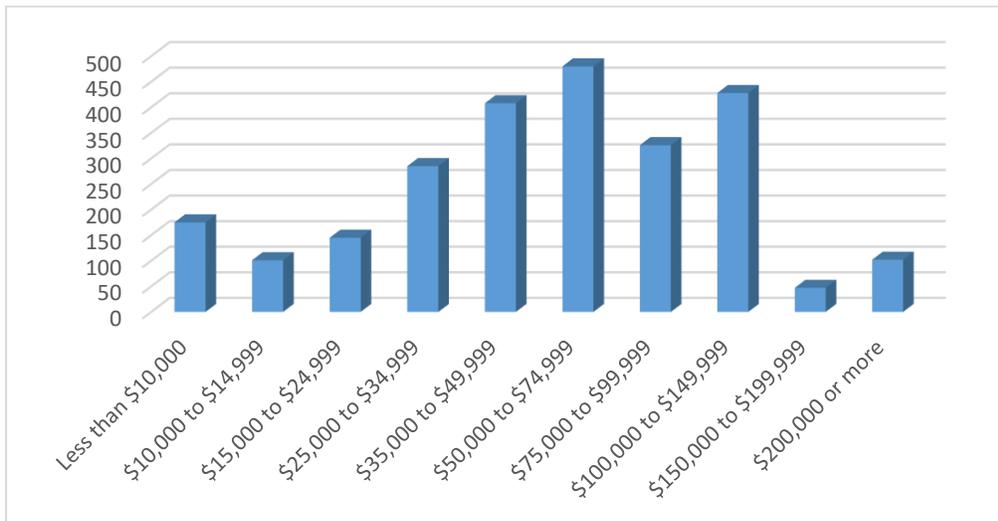
Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Figure B-2 Edgewater Population Distribution by Age



Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Figure B-3 Edgewater Income Distribution



Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

B.2.3 Social Vulnerability

Social vulnerability scores for the entirety of Jefferson County can be seen in Figures 2-2 through 2-6 in Section 2 of the Base Plan. Edgewater’s overall social vulnerability is below average compared to the rest of Jefferson County and Colorado as a whole. In particular, Edgewater’s vulnerability ranks low in the household composition and disability vulnerability category. However, the City’s vulnerability ranks above average in the socioeconomic and minority status and language vulnerability categories. Resources and measures to reduce the social determinants of disasters may be most effectively allocated to these areas. Moreover, it is critical that the City analyze the individual social vulnerability indicators that make those parts of the community stand out. Through ongoing evaluation, the City of Edgewater will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

B.2.4 Growth and Development Trends

Table B-4 shows the various types and amounts of housing units in the City of Edgewater based on data from the American Community Survey Five Year Estimates for 2015-2019. As shown in the table, most housing units (47.3%) are single family homes (1-unit detached) in Edgewater, however this still makes up less than half of the total housing stock in the city.

Table B-4 City of Edgewater Types and Total Housing Units

Type of housing units	Total	%
Total housing units	2,607	
1-unit detached	1,234	47.3%
1-unit attached	176	6.8%
2 units	112	4.3%
3 or 4 units	100	3.8%
5 to 9 units	242	9.3%
10 to 19 units	339	13.0%
20 or more units	404	15.5%
Mobile home	0	0.0%
Boat, RV, van, etc.	0	0.0%

Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

The Edgewater planning team members report that while infill and redevelopment of the City’s residential and commercial areas are anticipated to continue, growth in hazard areas is not a significant factor for the City.

Table B-5 illustrates how Edgewater has grown in terms of population and number of housing units between 2015 and 2019. The table illustrates that while Edgewater’s population is not growing very much, there is some housing construction and infill development.

Table B-5 City of Edgewater’s Change in Population and Housing Units, 2015-2019

2015 Population	2019 Population Estimate	Estimated Percent Change 2015-2019	2015 # of Housing Units	2019 Estimated # of Housing Units	Estimated Percent Change 2015-2019
5,237	5,328	+1.74%	2,540	2,607	+2.6%

Source: U.S. Census Bureau American Community Survey

B.2.5 Natural, Cultural, and Historic Resources

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

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing 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

The City of Edgewater operates four community parks throughout Edgewater. Citizen’s Park is a six-acre multi-use park located in the eastern portion of the city. Amenities located in Citizen’s Park include a ball field, picnic pavilion, horse-shoe courts, and a small playground. Walker Branch Park is a 13-acre park located on the southern border of Edgewater, shared with the City of Lakewood. Memorial Park is a small pocket park approximately a quarter of an acre in size with picnic areas. Heritage Center Park is located to the north of the Heritage Center. For information about natural resources in Jefferson County, which includes Edgewater, see Section 4.2.3 of the Base Plan.

Historic and Cultural Resources

There are no properties in Edgewater that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties; for more information about these registers, see Section 4.2.3 of the Base Plan.

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. There are currently no Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) buildings in the City of Edgewater.

The City of Edgewater currently has 2 designated historic structures located in the City. A structure may be designated for preservation if it has historical, architectural, or geographical importance to the community. Table B-6 lists Edgewater’s designated historic landmarks.

Table B-6 Additional Historic Landmarks in Edgewater

Property	Address
Orum House	2444 Depew Street
Edgewater Heritage Center	W. 25 th and Chase Street

Source: City of Edgewater

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.

B.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the City of Edgewater using the same methodology as in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Table B-7 lists the significance of each hazard for the City of Edgewater based on the updated risk assessment and planning team input. The highest risk hazards were determined to be cyber attack, flood, and pandemic.

Table B-7 City of Edgewater – Hazards Summary

Hazard	Geographic Extent	Probability of Future Occurrence	Potential Severity/Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Limited	Likely	Critical	High
Dam Failure	Significant	Occasional	Catastrophic	Medium
Drought	Extensive	Likely	Negligible	Low
Earthquake	Extensive	Unlikely	Critical	Medium
Erosion and Deposition	Extensive	Likely	Limited	Low
Expansive Soils	Limited	Unlikely	Negligible	Low
Extreme Temperatures	Extensive	Likely	Limited	Medium
Flood	Extensive	Highly Likely	Critical	High
Hailstorm	Extensive	Likely	Limited	Low
Landslide, Debris flow, Rockfall	Limited	Unlikely	Negligible	Low
Lightning	Limited	Likely	Negligible	Low
Pandemic	Extensive	Likely	Critical	High
Severe Winter Storms	Extensive	Highly Likely	Limited	Medium
Subsidence	Limited	Unlikely	Negligible	Low
Tornado	Extensive	Occasional	Critical	Medium
Wildfire	Limited	Unlikely	Negligible	Low
Windstorm	Extensive	Likely	Limited	Medium
<p>Geographic Extent</p> <p><u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences</p> <p><u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences</p> <p><u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences</p> <p><u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Severity/Magnitude</p> <p><u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.</p> <p><u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.</p> <p><u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.</p> <p><u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences</p> <p><u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.</p> <p><u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.</p> <p><u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years</p> <p><u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance</p> <p><u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. Also used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.</p> <p><u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. Also used for hazards with a high impact rating but an extremely low frequency.</p> <p><u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. Also used for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		

B.4 Community Asset Inventory

Table B-8 represents an inventory of improved parcels, properties, and their improvement and content values for the City of Edgewater. See Section 4.2 of the Base Plan for details and methodology.

Table B-8 City of Edgewater’s Property Inventory

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Commercial	45	79	\$35,300,820	\$35,300,820	\$70,601,640
Exempt	12	13	\$24,162,201	\$24,162,201	\$48,324,402
Industrial	2	2	\$304,000	\$304,000	\$608,000
Mixed Use	10	16	\$11,148,577	\$11,148,577	\$22,297,154
Residential	1,411	1,697	\$371,406,665	\$185,703,333	\$557,109,998
Total	1,480	1,807	\$442,322,263	\$256,618,931	\$698,941,194

Source: Jefferson County Assessor

Table B-9 is a detailed inventory of assets identified by the City’s planning team. This inventory includes critical facilities. For more information about how “critical facility” is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table B-9 City of Edgewater’s Assets

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Edgewater Civic Center	\$9,000,000	300	
Edgewater Public Works	\$400,000	10	
Jefferson High School	\$5,000,000	1000	
Edgewater Elementary	\$5,000,000	700	
Lumberg Elementary	\$5,000,000	700	
Edgewater Plaza	\$15,000,000	500	
Tiny Hearts. Daycare	\$200,000	40	
Lightway at Sloans Daycare	\$200,000	25	
Edgewater Marketplace	\$20,000,000	1500	Flooding
Edgewater Heritage Center	\$750,000	100	
Edgewater Public Market	\$20,000,000	1500	

Many of the facilities listed above are also in GIS databases provided by the City of Edgewater and Jefferson County. Critical facility counts and types are shown in Table B-10 and in the map in Appendix H. Shelters may be in facilities such as schools or recreation centers and are not indicated on the map. The critical facilities are organized by FEMA Lifelines. For additional information on the definitions behind each critical facility category, source, and other details refer to Section 4.2.2 of the Base Plan.

Table B-10 Summary of Edgewater’s Critical Facilities in GIS

FEMA Lifeline	Facility Count
Communications	4
Food, Water, Shelter	1
Health and Medical	1
Safety and Security	7
Transportation	1
Grand Total	14

Source: Jefferson County, HFLD

B.5 Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the City of Edgewater, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the City’s risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Dam Failure
- Drought
- Geologic Hazards
- Earthquake
- Erosion and Deposition
- Expansive Soils
- Extreme Temperatures
- Hailstorm
- Lightning
- Tornado
- Windstorm
- Winter Storm
- Cyber Attack
- Pandemic/Public Health

This section details vulnerability to specific hazards, where quantifiable, and where it differs from that of the overall County. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas. For a discussion of the methodology used to develop the loss estimates refer to Section 4.3 of the Base Plan.

B.5.1 Flood

According to the GIS vulnerability assessment conducted for this plan update, Edgewater has some risk of losses due to flooding. Note that this is based on computer modeling that may not reflect site specific mitigation activities.

According to the analysis Edgewater has a mix of residential, commercial, mixed-use, and exempt properties potentially at-risk to flooding. Figure B-4 depicts the FEMA flood zones (1% annual chance and 0.2% annual chance) as well as all the at-risk properties in Edgewater.

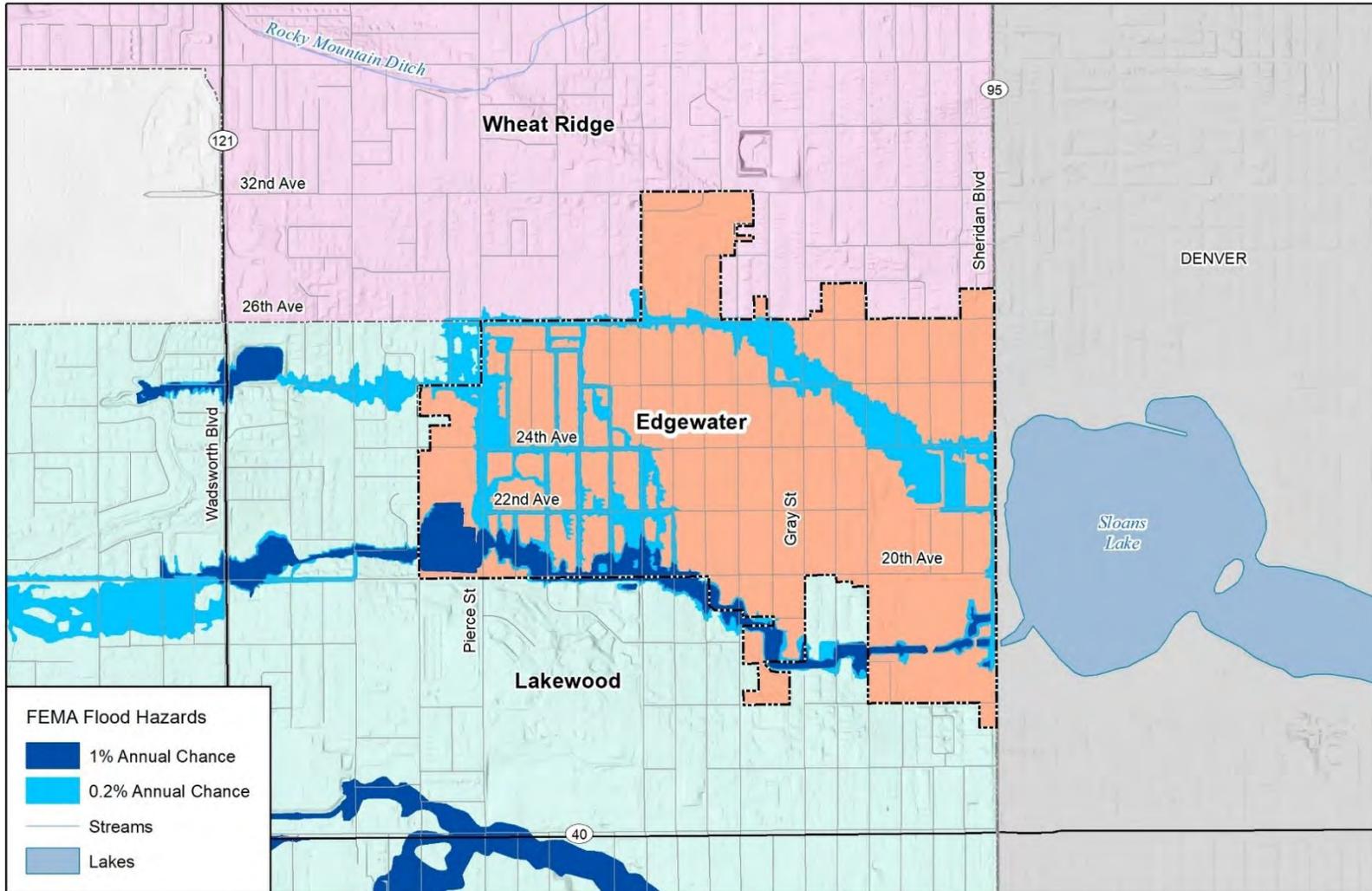
Table B-11 shows the parcels and buildings at risk to the 1% annual chance flood. For this analysis, content values were estimated based on prevailing land use and a multiplier was applied to building and content values to estimate losses to each. See Section 4 Hazard Profiles for details on methodology. According to the analysis, 33 buildings (all of which are residential) are at risk, totaling \$4.1M of damage to buildings and contents. Note that this analysis does not account for properties which may have been built in accordance with local floodplain regulations and mitigated to the 1% annual chance flood.

Table B-11 City of Edgewater Buildings & Values At-Risk to 1% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Total Loss Estimate	% of Total Buildings
Residential	23	33	\$11,012,162	\$5,506,081	\$16,518,243	\$4,129,561	1.9%
Total	58	33	\$11,012,162	\$5,506,081	\$16,518,243	\$4,129,561	1.8%

Source: Jefferson County Assessor

Figure B-4 City of Edgewater 1% and 0.2% Annual Chance Flood Hazard



wood.

Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

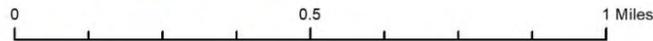


Table B-12 shows the parcels and buildings at risk to the 0.2% annual chance flood. For this analysis, content values were estimated based on prevailing land use and a multiplier was applied to building and content values to estimate losses to each. See Section 4 Hazard Profiles for details on methodology. According to the analysis, 166 buildings (160 of which are residential) are at risk, totaling \$11.5 million of damage to buildings and contents over and above the 0.2% scenario.

Table B-12 City of Edgewater Buildings & Values At-Risk to 0.2% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Total Loss Estimate	% of Total Buildings
Commercial	2	2	\$908,775	\$908,775	\$1,817,550	\$454,388	2.5%
Exempt	1	1	\$28,499	\$28,499	\$56,998	\$14,250	7.7%
Mixed Use	1	3	\$887,171	\$887,171	\$1,774,342	\$443,586	18.8%
Residential	148	160	\$28,309,534	\$14,154,767	\$42,464,301	\$10,616,075	9.4%
Total	152	166	\$30,133,979	\$15,979,212	\$42,113,191	\$11,528,298	9.2%

Source: FEMA NFIP, Jefferson County Assessor's Office

GIS analysis showed that there is 1 critical facility in the 1% annual chance flood zone and no critical facilities in the 0.2% annual chance flood zone, see Table B-13.

Table B-13 City of Edgewater Critical Facilities in 1% Annual Chance Floodplain

FEMA Lifeline	Facility Type	Facility Count
Transportation	Bridge	1
Total		1

Source: FEMA NFIP, HFLD

Previous Flood Events

Through the Data Collection Guide, the City of Edgewater noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Jefferson County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction.

The events noted by this jurisdiction in the Data Collection Guide include:

1974 Flood

The Edgewater Four Score History Book records the events of the 1974 flood that struck Edgewater. Extensive flooding struck the city, with the worst damage at 20th and Harlan. Two deaths were reported as a result of this flood.

1999 Flood

Flooding and flash flooding problems developed over portions of the Urban Corridor as slow moving thunderstorms dumped anywhere from 2 to 3.5 inches of rainfall in approximately 3 hours. The 1700 block of Sheridan was extensively flooded. Power outages were reported. No injuries or deaths occurred in Edgewater.

B.5.2 Wildfire

There is no significant wildfire risk in Edgewater.

B.5.3 Other Hazards

The city of Edgewater is not at risk to dam failure or other geologic hazards such as landslide, rockfall, subsidence or dipping bedrock.

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, lightning, tornado, and windstorm the entire building inventory and population in the City is potentially exposed. That is the reason for the asset inventory provided in Section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

Previous Hazard Events

Through the Data Collection Guide, the City of Edgewater noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Jefferson County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction.

The events noted by this jurisdiction in the Data Collection Guide include:

October 1994 Hailstorm

A band of hail struck Edgewater on October 1, 1994. 1.5" diameter hail struck the entire City. Extensive damage was done to automobiles and homes in the Edgewater area. This storm caused \$225 million in damages in Edgewater and the surrounding area. At the time, this was the third most costly storm in Colorado history.

March 2003 Blizzard

A very moist, intense, and slow moving Pacific storm system made its way across the four corners area and into southeastern Colorado from March 17th to the 19th, allowing for a deep easterly upslope flow to form along the Front Range. Up to three feet of snow fell. 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. Most businesses were completely shut down for several days during the busy holiday season. In fact, there was a near shutdown of the entire city for several days.

December 2006 Blizzards

Back to back blizzards struck the city a week apart in late December of 2006. The first blizzard, on December 20, struck as a result of a slow moving low pressure system that moved from the Desert Southwest into Southeastern Colorado. As a result, a deep upslope flow developed along the Front Range and Northeast Plains of Colorado. One to two feet of snow were recorded. On December 28, another slow moving storm system moved from the Desert Southwest and into the Texas Panhandle. As it did, a deep easterly upslope flow occurred along the Front Range, with blizzard conditions developing over portions of the Northeast Plains of Colorado, mainly south of Interstate 76. The heaviest snow fell along east facing slopes with storm totals up to 2 1/2 feet in the North Central Mountains and Front Range Foothills.

B.6 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. Edgewater's regulatory, administrative, and technical, and fiscal mitigation capabilities are summarized in Section 2.7 of the Base Plan. Additional details on specific capabilities are discussed below. The City of Edgewater is planning updates to their Comprehensive Plan in 2021, which provides an opportunity to incorporate the recent information included in this plan update and capitalize on regulatory tools for the purpose of hazard mitigation. The City is also in the process of updating the Police Department's disaster plan in 2021.

National Flood Insurance Program

The City of Edgewater joined the National Flood Insurance Program (NFIP) on August 15, 1989. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. The Community Rating System CRS is a voluntary program for NFIP-participating communities. It provides flood

insurance discounts to policyholders in communities that provide extra measures of flood above the minimum NFIP requirements. As of September 2015, Edgewater does not participate in the CRS.

NFIP insurance data indicates that as of March 2021, there were 32 policies in force in Edgewater, resulting in \$8,709,500 of insurance in force. In Edgewater, there have been 27 historical claims for flood losses totaling \$51,637. There are no repetitive or severe repetitive loss structures as defined by the NFIP. Edgewater's initial Flood Insurance Rate Map became effective on 8/15/89. The most current Digital Flood Insurance Rate Maps were updated and became effective on 2/5/14. The municipal code has been updated to reflect the current mapping. Digital map products are used for floodplain management.

The Edgewater Comprehensive Plan 2013

The City of Edgewater has published a comprehensive plan in 2013, with updates planned in 2021, to guide the City in making decisions and to establish its future direction. The goals and policies contained within the plan cover a broad range of subject matter related to services, issues, and geographic areas within the community. Combined, these elements serve to direct future policy decisions to preserve vital community attributes and service levels and manage growth.

The following excerpts are goals and related policies that are relevant to this hazard mitigation plan.

Community Character and Design: Goal 3 – Enhance the sustainability and appearance of the community through natural amenities in neighborhoods and commercial corridors.

- Increase tree canopy cover
- Encourage landscaping that improves storm water management through low impact design

Public Services and Infrastructure: Goal 2 – Ensure that adequate infrastructure and public services are available.

- Accommodate future growth and redevelopment without burdening the existing infrastructure system

Public Services and Infrastructure: Goal 3 – Promote and support programs and investments that increase sustainability.

- Reduce the impact of storm runoff and water quality within city neighborhoods and adjacent communities.
- Create a storm water management plan that establishes guidelines for on-site treatment of storm water.

Opportunities for Enhancement

Based on the capability assessment, Edgewater has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Table 2-15 in the Base Plan shows the potential financial benefits from increasing the City's Community Rating System class. The HMPC identified additional outreach and education on mitigation actions residents can take as an area where mitigation activities can be enhanced. Also, increased planning and coordination to address sewer backups and water main breaks would enhance the City's capabilities. Other future improvements may be the incorporation of risk and hazard information into future comprehensive plan updates, the next anticipated to start in 2021.

B.7 Plan Implementation and Maintenance

Edgewater has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the City will continue public participation in the plan maintenance process.

B.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The City of Edgewater recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, information from the 2016 Hazard Mitigation Plan is incorporated into comprehensive plans and considered when updating local codes and plans.

B.7.2 Monitoring, Evaluation, and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Edgewater Community Services and Police Department will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. Edgewater Community Services and Police Department will also be responsible for representing the City on future Jefferson County HMPC meetings, and for coordination with city staff and departments during plan updates. The City will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by City Council.

The City of Edgewater will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

B.8 Mitigation Actions

The City of Edgewater has adopted the hazard mitigation goals and objectives developed by the Planning Team and described in Section 6.2 of the Base Plan.

The City had three mitigation actions in the 2016 Plan, and did not complete any of them. One action was deleted after having been identified as no longer relevant by the planning team:

- Continued Validation of Flood Response Protocol Identified in 2007 EOP through Practical Training and Exercises Design

The remaining actions have been carried over into the 2021 Plan, along with three new actions.

B.8.1 National Flood Insurance Program

Recognizing the importance of the National Flood Insurance Program (NFIP) in mitigating flood losses, the City of Edgewater will place an emphasis on continued compliance with the NFIP. As an NFIP participant, the City has 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 as well as review of any potential development in special flood hazard areas.

B.8.2 Mitigation Actions

The local planning team identified and prioritized the following mitigation actions for the City of Edgewater based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

H&M: Health & Medical

ENG: Energy

S&S: Safety & Security

FWS: Food, Water, Sheltering

TRN: Transportation

HAZ: Hazardous Waste

Table B-14 City of Edgewater Mitigation Action Plan

Number	Title and Description	Hazard(s) Mitigated	Related Goals & Lifelines	Lead Agency and Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status / Implementation Notes
Edgewater 1	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The City of Edgewater participates in the National Flood Insurance Program. This project restates the commitment of City of Edgewater to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations. This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date. Benefits include reduced property loss from floods, continued availability of flood insurance for residents.	Flood	1,2;	City Engineer's Office	Low Covered in existing budget	Medium	Ongoing with activities implemented annually or as needed during development review.	In Progress Involved in floodplain study.
Edgewater 2	Coordinate Management with the Mile High Flood District on the Storm Water Drainage Detention Basins. The City of Edgewater has, over the past 20 years, mitigated flooding by a drainage project that includes holding areas for water and a drainage canal. This is part of a larger project run by the Urban Drainage and Flood Control District. Benefits include reduced property loss from floods.	Flood	1,2;	City Engineer's Office	Low Covered in existing budget	Medium	Ongoing	In progress Currently working with MHFD on potential project.
Edgewater 3	25th Ave. Storm Water Undergrounding. As part of converting part of 25th to a one-way, the city is planning to underground stormwater.	Flood	1,2;	City Engineer's Office	Medium Redevelopment Funds	High	2021	New in 2021
Edgewater 4	Cyber attack mitigation. Upgrade firewalls, security for wifi, passwords and increase employee education.	Cyber	1; COM, S&S	Community Resources	Medium Covered in existing budget	High	Ongoing	New in 2021

Number	Title and Description	Hazard(s) Mitigated	Related Goals & Lifelines	Lead Agency and Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status / Implementation Notes
Edgewater 5	Increased safety and mitigation information (website/newsletters). Use various resources like Ready.gov and https://dhsem.colorado.gov/info-center/colorado-hazard-information to help provide education to residents.	Avalanche; Cyber; Dam Failure; Drought; Earthquake; Erosion /Deposition; Expansive Soils; Extreme Temps; Flood; Hailstorm; Landslides; Lightning; Pandemic; Winter Storms; Subsidence; Tornado; Wildfire; Windstorm	1;	Communications	Low City General Fund	Medium	Ongoing and implemented on an annual basis.	New in 2021

Annex C. City of Golden

C.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The City of Golden fully participated in the 2021 update process as described in Section 3. The City had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section C.9. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the City on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

C.2 Community Profile

Figure C-1 shows a map of the City of Golden.

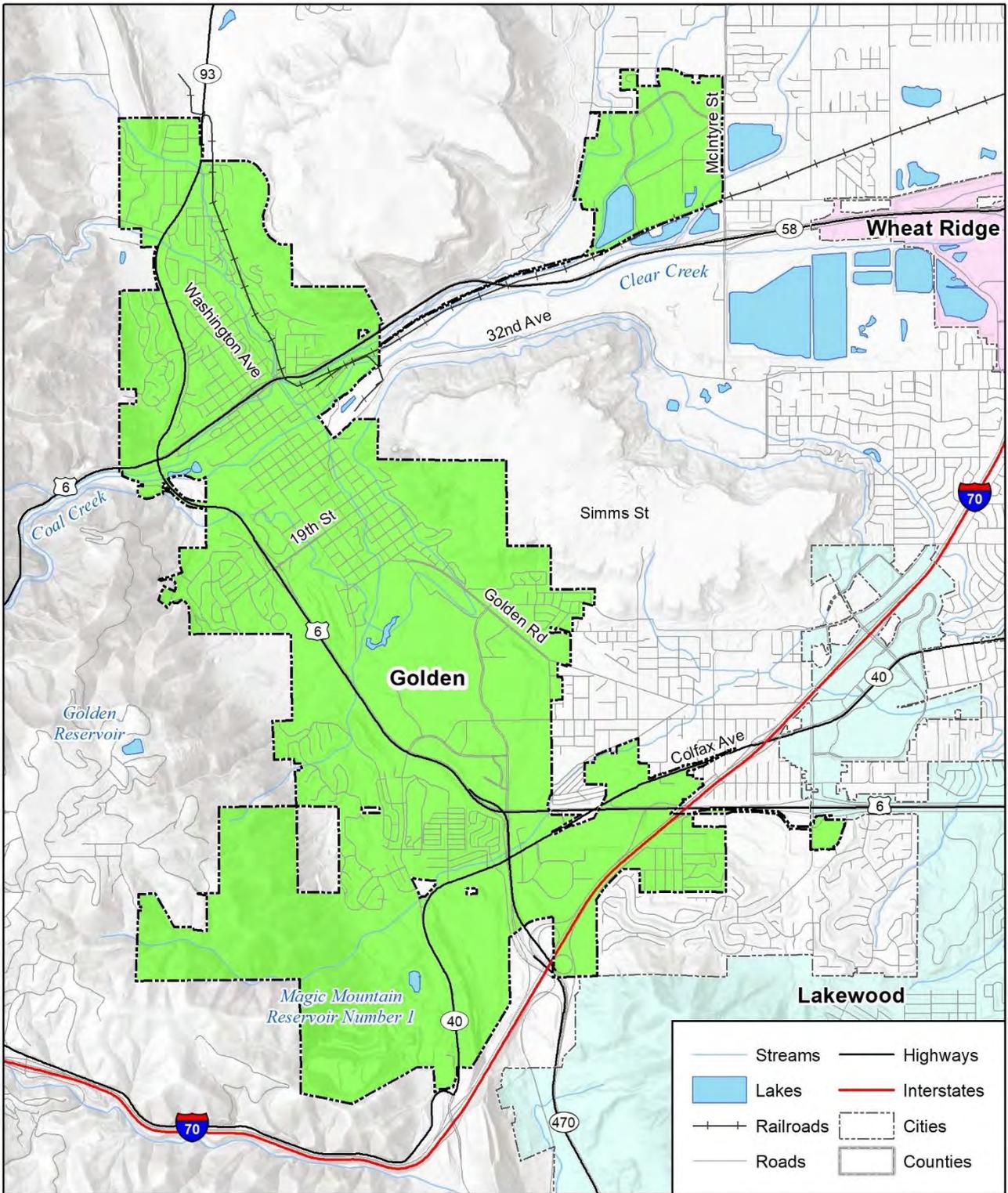
C.2.1 History

The historic City of Golden is the Home Rule Municipality that is the county seat of Jefferson County, Colorado, United States. Golden lies along Clear Creek at the base of the Front Range of the Rocky Mountains.

Established as a gold rush town, Golden quickly became a leading economic and political center of the region, being a center of trade between the gold fields and the east, a crossroads and gateway of important roads leading to the mountains, and a center of area industry. By the close of 1860, Golden City had been popularly elected the seat of Jefferson County and was the capital of the provisional Jefferson Territory. While the town lost much of its populace and leading citizenry during the American Civil War for several reasons ranging from military to economic, Golden became capital of the federally recognized Colorado Territory in 1862, continuing as such until 1867. Golden became the “Lowell of the West”, a regional center of trade and industry that boasted at certain points in time three flour mills, five smelters, the first railroad into the Colorado mountains, the Coors Brewery, brick works, the only paper mill west of Missouri, clay and coal mines, and more. During the 1870s it became home to three institutions of higher education, the Colorado University Schools of which the Colorado School of Mines remains today. Golden was also home to an opera house and seven churches including Colorado’s third (Methodist) church, oldest Baptist church, likely oldest Christian (Disciples of Christ) church, and first Swedish immigrant (Lutheran) church. The town was home to sizable populations of German, Swedish, Italian, and Chinese immigrants; five immigrants became mayors of Golden.

Until the early 20th century Golden maintained a small town population of around 2,500 people. Several industries faded or were destroyed by tragic events, but others flourished to continue Golden’s industrial legacy including its brewing, brickmaking, clay mining and porcelain industries. Golden became even more connected through mass transit, with two trolley lines extending to Denver, while the movie theater gradually took the place of the opera house for downtown entertainment. Downtown revitalization efforts began in the 1920s with its first streetscape and ornamental lighting project and urban renewal on its north and east, anchored by new senior high and grade schools. The historic cultural tension between the city’s north and south sides gradually eased, and the town successfully endured additional major economic depressions including the Silver Crash of 1893 and the Great Depression. The School of Mines gained a worldwide academic reputation, Coors rapidly came to the forefront of the national and international brewing and ceramics industries, and the city modernized with a recreation center, paved streets and more.

Figure C-1 City of Golden



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

After World War II Golden boomed, rapidly gaining population, size, and economy. In 1959 the town nearly tripled in geographic size overnight when it annexed large properties to the south including the new Magic Mountain theme park, one of the earliest entertainment attractions of its kind. A number of new subdivisions were built, and public infrastructure was modernized including new buildings for the senior high school, city hall, recreation center, library, museum and central fire and police stations. Also built were new downtown anchors including department stores and grocery stores, several new church buildings, new county offices, and the Horizon Plan which transformed the School of Mines.

The oil crash and near simultaneous failure of several downtown anchors placed its central business district into recession by the 1980s, and the downtown was revitalized again through various initiatives including its second streetscaping project in 1992. In 1993 the old Golden High School building was converted into the American Mountaineering Center making Golden a premier research and education hub for mountaineering. The Coors Brewery had become the largest single site brewery in the world, its Porcelain subsidiary among the foremost of its kind in the world, and Golden became home to the National Renewable Energy Laboratory. Today Golden has a population of over 17,000 people and is home to more people and businesses of national and international influence than ever before yet maintains a small town historic identity.

C.2.2 Population

The U. S. Census Bureau's estimated 2019 population of Golden was 20,693. The following tables and graphs summarize key demographic and social characteristics of the City of Golden based on the U.S. Census Bureau's American Community Survey, 5-Year Estimates, 2015-2019.

Table C-1 Golden Demographic and Social Characteristics

Golden	2015	2019	% Change
Population	19,780	20,693	4.62%
Median Age	30.1	33.5	11.3%
Total Housing Units	7,600	8,055	6.0%
Housing Occupancy Rate	95.1%	94.6%	-0.5%
% of Housing Units with no Vehicles Available	4.5%	6.3%	40.0%
Median Home Value	\$399,300	\$522,200	30.8%
Unemployment Rate	4.3%	4.6%	7.0%
Mean Travel Time to Work (minutes)	23.4	25.2	7.7%
Median Household Income	\$58,998	\$72,349	22.6%
Per Capita Income	\$34,207	\$39,184	14.5%
% of Individuals Below Poverty Level	16.8%	15.8%	-6.0%
% Without Health Insurance	6.5%	3.9%	-40.0%
# of Households	7,225	7,618	5.4%
Average Household Size	2.4	2.3	-1.7%
% of Population Over 25 with High School Diploma or Higher	93.9%	94.7%	0.9%
% of Population Over 25 with Bachelor's Degree or Higher	55.0%	56.3%	2.4%
% with Disability	6.9%	8.9%	29.0%
% Speak English less than "Very Well"	3.3%	3.0%	-9.1%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table C-2 Golden Demographic & Social Characteristics Compared to the County & State

Demographic & Social Characteristics (as of 2019)	Golden	County	Colorado
Median Age	33.5	40.3	36.7
Housing Occupancy Rate	94.6%	96.4%	90.0%
% of Housing Units with no Vehicles Available	6.3%	3.9%	5.1%
Median Home Value	\$522,200	\$397,700	\$343,300
Unemployment	4.6%	3.6%	4.3%
Mean Travel Time to Work (minutes)	25.2	28	25.8
Median Household Income	\$72,349	\$82,986	\$72,331
Per Capita Income	\$39,184	\$44,119	\$38,226
% of Individuals Below Poverty Level	15.8%	7.1%	10.3%
% Without Health Insurance	3.9%	5.5%	7.6%
Average Household Size	2.3	2.40	2.56
% of Population Over 25 with High School Diploma or Higher	94.7%	94.5%	91.7%
% of Population Over 25 with bachelor's degree or Higher	56.3%	45.2%	40.9%
% with Disability	8.9%	10.0%	10.6%
% Speak English less than "Very Well"	3.0%	3.0%	5.8%

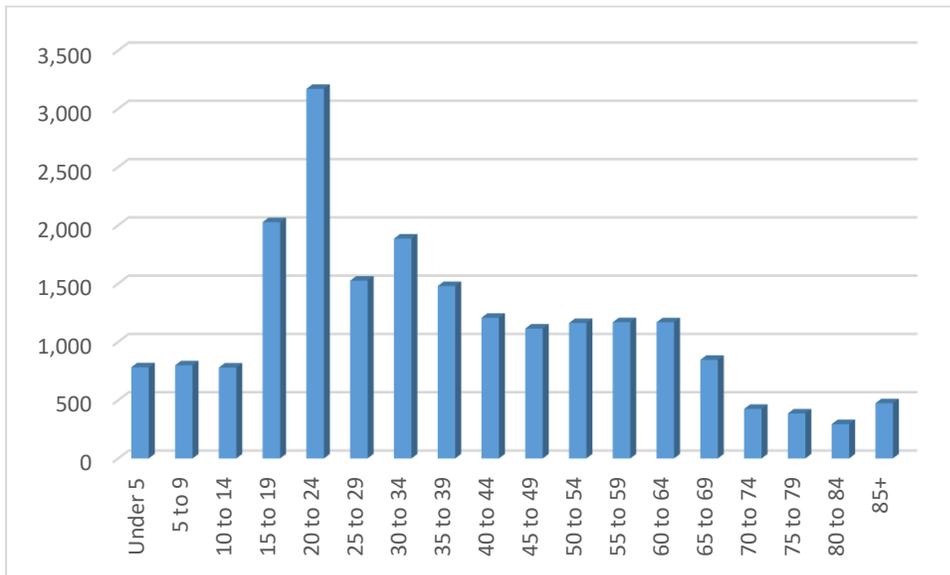
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table C-3 Golden Demographics by Race and Sex

Golden	Population	%
Total Population	20,693	
Male	12,004	58.0%
Female	8,689	42.0%
White, not Hispanic	17,697	85.5%
Hispanic or Latino	1,595	7.7%
Black	368	1.8%
Asian	533	2.6%
American Indian and Alaska Native	78	0.4%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	44	0.2%
Two or more races	378	1.8%

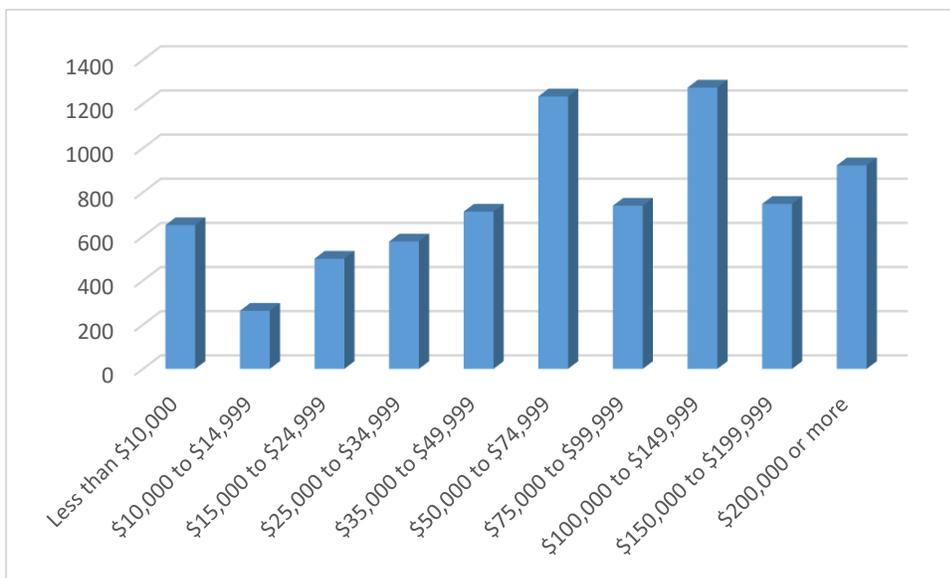
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Figure C-2 Golden Population by Age



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Figure C-3 Golden Income Distribution



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

C.2.3 Social Vulnerability

Social vulnerability scores for the City of Golden can be seen in Figures 2-2 through 2-6 in Section 2 of the Base Plan. The City of Golden is characterized by a mix of low (bottom 20% in the county) to high (top 20% in the county) levels of social vulnerability. In particular, the City ranks high for socioeconomic vulnerability as well as housing and transportation vulnerability. However, the City ranks below average for household composition and disability vulnerability. Resources and measures to reduce the social determinants of disasters may be most effectively allocated to these areas. Moreover, it is critical that the City analyze the individual social vulnerability indicators that make those parts of the community stand out. Through ongoing evaluation, the City of Golden will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

C.2.4 Growth and Development Trends

Table C-4 shows the various types and amounts of housing units in the City of Golden based on data from the American Community Survey Five Year Estimates for 2015-2019. As shown in the table, most housing units (58%) are single family homes (1-unit detached/attached) in Golden, but the City has a relatively high proportion of multiple unit buildings.

Table C-4 City of Golden Types and Total Housing Units

Type of Housing Units	Total	%
Total housing units	8,055	
1-unit detached	3,854	47.8%
1-unit attached	836	10.4%
2 units	103	1.3%
3 or 4 units	521	6.5%
5 to 9 units	371	4.6%
10 to 19 units	560	7.0%
20 or more units	1,020	12.7%
Mobile home	778	9.7%
Boat, RV, van, etc.	12	0.1%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table C-5 illustrates how Golden has grown in terms of population and number of housing units between 2010 and 2019. The table illustrates that Golden is undergoing moderate growth. Geographically, Golden is limited in the size and scope of development opportunities. New multi-housing senior living complexes with 210 units are currently being built along with commercial property on the north end of the City, adjacent to open grassland area and city maintenance shops.

Table C-5 City of Golden's Change in Population and Housing Units, 2010-2019

2010 Population	2019 Population Estimate	Estimated Percent Change 2010-2019	2010 # of Housing Units	2019 Estimated # of Housing Units	Estimated Percent Change 2010-2019
18,905	20,693	9.5%	7,748	8,055	4.0%

Source: US Census, American Community Survey, 5-Year Estimates 2015-2019

C.2.5 Natural, Cultural, and Historic Resources

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

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

Natural Resources

The City of Golden owns and maintains 402 acres of open space as well as 24 miles of multi-use trails. Within Golden itself, there are 22 city parks totaling 253 acres including a recreational vehicle park, 3 sports complexes, a white water river park and a community center. On the outskirts of the City are many

Jefferson County Open Space parks, as well as North and South Table Mountain. For information about natural resources in Jefferson County, which includes Golden, see Section 4.2.3 of the Base Plan.

Historic and Cultural Resources

Table C-6 lists the 16 properties in Golden that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties; for more information about these registers, see Section 4.2.3 of the Base Plan.

Table C-6 Golden's Historic Properties/Districts in National and State Registers

Property Name	Register	Listed Date
Astor House Hotel	National	3/1/1973
Barnes--Peery House	National	10/12/2001
Calvary Episcopal Church	National	3/3/1995
Colorado National Guard Armory	National	12/18/1978
Coors, Herman, House	National	10/17/1997
First Presbyterian Church of Golden--Unger House	National	3/14/1991
Golden Cemetery	National	4/18/2012
Golden High School	National	3/14/1997
Golden Welcome Arch	State	6/14/2000
Loveland Building and Coors Building	National	5/16/1996
Magic Mountain Site	National	8/21/1980
Mount Vernon House	National	11/20/1970
Oscar Barber House	State	6/13/1994
Quaintance Block	National	3/25/1994
Rooney Ranch	National	2/13/1975
Twelfth Street Historic Residential District	National	9/22/1983

Sources: National Register of Historic Places, <https://www.nps.gov/subjects/nationalregister/> and Colorado State Register of Historic Properties: <https://www.historycolorado.org/colorado-state-register-historic-properties>

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. There are currently 36 Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) buildings in the vicinity of the City of Golden (located at Rocky Flats), however there are none inside the City limits.

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.

C.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the City of Golden using the same methodology as in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Table C-7 lists the significance of each hazard for the City of Golden based on the updated risk assessment and planning team input. The highest risk hazards were determined to be flood, severe winter storm, wildfire, and windstorm.

Table C-7 City of Golden – Hazards Summary

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance
Avalanche	Unlikely	Limited	Negligible	Low
Cyber Attack	Likely	Significant	Limited	Medium
Dam Failure	Unlikely	Limited	Limited	Medium
Drought	Occasional	Extensive	Limited	Low
Earthquake	Occasional	Extensive	Limited	Low
Erosion and Deposition	Likely	Limited	Negligible	Low
Expansive Soils	Likely	Extensive	Negligible	Low
Extreme Temperatures	Unlikely	Extensive	Negligible	Low
Flood	Occasional	Limited	Catastrophic	High
Hailstorm	Likely	Extensive	Limited	Medium
Landslide, Debris flow, Rockfall	Likely	Limited	Limited	Low
Lightning	Highly Likely	Limited	Negligible	Low
Pandemic	Occasional	Extensive	Critical	High
Severe Winter Storms	Highly Likely	Extensive	Limited	High
Subsidence	Unlikely	Limited	Negligible	Low
Tornado	Unlikely	Significant	Catastrophic	Low
Wildfire	Likely	Significant	Limited	High
Windstorm	Highly Likely	Extensive	Limited	High
<p>Geographic Extent</p> <p><u>Negligible</u>: Less than 10 percent of planning area or isolated single-point occurrences</p> <p><u>Limited</u>: 10 to 25 percent of the planning area or limited single-point occurrences</p> <p><u>Significant</u>: 25 to 75 percent of planning area or frequent single-point occurrences</p> <p><u>Extensive</u>: 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Severity/Magnitude</p> <p><u>Negligible</u>: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.</p> <p><u>Limited</u>: 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.</p> <p><u>Critical</u>: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.</p> <p><u>Catastrophic</u>: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences</p> <p><u>Unlikely</u>: Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.</p> <p><u>Occasional</u>: Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.</p> <p><u>Likely</u>: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years</p> <p><u>Highly Likely</u>: Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance</p> <p><u>Low</u>: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. Also used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.</p> <p><u>Medium</u>: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. Also used for hazards with a high impact rating but an extremely low frequency.</p> <p><u>High</u>: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. Also used for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		

C.4 Community Asset Inventory

Table C-8 shows the total number of improved parcels, properties, and their improvement and content values for the City of Golden. See Section 4.2 of the Base Plan for details and methodology.

Table C-8 Golden's Property Inventory

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Agriculture	1	1	\$35,437	\$35,437	\$70,874
Commercial	277	377	\$530,314,287	\$530,314,287	\$1,060,628,574
Exempt	61	126	\$331,145,437	\$331,145,437	\$662,290,874
Industrial	171	189	\$288,997,711	\$288,997,711	\$577,995,422
Mixed Use	111	128	\$127,869,228	\$127,869,228	\$255,738,456
Residential	5,245	6,134	\$2,303,042,937	\$1,151,521,469	\$3,454,564,406
Total	5,866	6,955	\$3,581,405,037	\$2,429,883,569	\$6,011,288,606

Source: Jefferson County Assessor's Office

Table C-9 is a detailed inventory of assets identified by the City's planning team. This inventory includes some critical facilities. For more information about how "critical facility" is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table C-9 Summary of Golden's Assets

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
City Hall, Police and Fire Station	\$9,536,000	≈375	Flooding
Station 2, 1201 Ulysses St	\$114,000	Minimal	
Station 3, 16023 W. 5th Ave.	\$94,600	Minimal	
Station 4, 151 Heritage Rd	\$1,349,500	Varies	
Xcel Energy Substation	Unknown	Unknown	Fire, explosion
Rooney Road Hazardous Materials Facility	Unknown	Unknown	Fire, explosion, contamination
Bulk Oil Storage	Unknown	Unknown	Fire, explosion, contamination; flooding
Mitchell Elementary School, 200 Rubey Dr.	Unknown	≈600	
Shelton Elementary School, 420 Crawford St.	Unknown	≈500	
Bell Middle School	Unknown	≈650	
Golden High School, 70124th St.	Unknown	≈1800	Flooding
The Johnson Program, 1200 Johnson Rd.	Unknown	≈100	
Cogwheel Kids Preschool, 610 22nd St	Unknown	≈50	
Discover Child Care Center, 17602 W. 14th Ave.	Unknown	≈150	
Golden Independent School, 1280 Golden Cir.	Unknown	≈50	
Kindercare Learning Center, 107 N. Rubey Dr.	Unknown	≈160	
South Table Mountain Preschool, 17701 W. 16th Ave.	Unknown	≈80	
Free Horizon Montessori Charter School, 581 Conference Place	Unknown	≈300	
Cradle to Crayons Learning Center, 18301 W. Colfax Ave.	Unknown	≈50	
US Post Office 17451 S Golden Rd.	Unknown	Unknown	
US Post Office, 619 12th St.	Unknown	Unknown	Flooding

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Wells Fargo Service Company, 1220 Ford St.	Unknown	Unknown	Flooding
Panorama Medical, 660 Golden Ridge Rd.	Unknown	Unknown	
Coors	Unknown	Multiple Buildings	Flooding
Colorado School of Mines	Unknown	Multiple Buildings	Flooding
Water Treatment Plant (multiple buildings)	\$15.545 million	Unknown	Flooding
Pylons at Lookout Mountain Road	Unknown	None	
Golden Arch	Unknown	None	Flooding
12th Street Historic District	Unknown	Multiple Buildings	Flooding
822 12th St. Astor House	\$806,700	Unknown	Flooding
805 13th St. Quaintance Block	Unknown	Unknown	Flooding
809 15th St. Foothills Art Center (First Presbyterian Church of Golden)	Unknown	Unknown	
509 18th St. James Cuyler Miller House	Unknown	Residential	
1301 Arapahoe St. Colorado National Guard Armory	Unknown	Multi-Residential	Flooding
714 Cheyenne St. Oscar Barber House/Montessori School of Golden	Unknown	≈100	Flooding
Heritage Road (Magic Mountain Archeological Site)	Unknown	None	
622 Water St. Peery House	Unknown	Residential	Flooding
6th Avenue	Unknown	None	
I-70	Unknown	None	
Highway 58	Unknown	None	Flooding
C-470	Unknown	None	
Burlington Northern Santa Fe Railroad	Unknown	None	Flooding
Jefferson County Government Complex	Unknown	Multiple Buildings	
Planning/Public Works	\$1,292,717		Flooding
Public Works – Shops	\$6,273,100	Multiple Buildings	Main concern is wildfire
Clear Creek Corridor – Threatened plant species: Ute Ladies Tresses Orchid	Unknown	None	Flooding, wildfire
Clear Creek History Park	\$318,987		Exterior area Flooding

Many of the facilities listed above are also in GIS databases provided by the City of Golden and Jefferson County. Critical facility counts and types are shown in Table C-10 and in the map in Figure C-4. Shelters may be in facilities such as schools or recreation centers and are not indicated on the map.

Table C-10 Summary of Golden’s Critical Facilities in GIS

FEMA Lifeline	Count
Communications	76
Energy	2
Food, Water, Shelter	2
Hazardous Materials	24
Health and Medical	4
Safety and Security	26
Transportation	19
Total	153

Source: Jefferson County Assessor (October 2015) HSIP Freedom 2015 and HAZUS 2.2

C.5 Vulnerability Assessment

This section details vulnerability to specific hazards, where quantifiable, and where it differs from that of the overall County. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas. For a discussion of the methodology used to develop the loss estimates refer to Section 4.3 of the Base Plan.

C.5.1 Dam Failure/Incidents

Past Events

Based on a search of the National Performance of Dams database there have been thirteen incidents in Jefferson County since 1952. Of these incidents reported to the National database, one incident lists Golden as the nearest town to the event. This was a seepage event at Chase Gulch Dam on the South Platte River on September 12, 2013, as part of the larger September 2013 flood event. The dam did not fail, and no damage is reported.

Dams of Concern

Table 4-11 in Section 4.3.3 of the Base Plan lists dams of concern for Jefferson County. Dams upstream of the City of Golden are shown in Table C-11.

Golden has one high hazard dam whose failure could impact life and/or property. Note: Hazard class does not indicate dam condition, it merely indicates risks in case of failure. A high hazard dam poses risk to both life and property, a significant hazard dam only poses a risk to property. See discussion the Section 4 of the Base Plan. The Lookout Mountain Dam has been given a satisfactory rating by the State Engineer.

Table C-11 Dams of Concern to City of Golden

Dam Name	Stream	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Lookout Mountain	Clear Creek	101	Yes	High

Source: National Inventory of Dams, NHD

Non-Failure Dam Incidents

As discussed in Section 4.3.3 of the Base Plan, the Colorado Department of Natural Resources, Dam Safety Division, has a statewide database that identifies the potential for non-failure dam inundation to show potential areas of flooding where outlet capacity exceeds the downstream channel capacity. The dams at the highest risk of non-failure inundation are shown in Table 4-14 of the Base Plan. The ranking shown in the table represents the likelihood of hazardous conditions existing below the dams during a worst case, maximum outlet release scenario. Dams are ranked as high, moderate, or low likelihood for outlet releases to cause conditions that could require an emergency response to reduce potential downstream consequences. The ranking is based on a statewide database of high hazard dams that includes 441 high hazard dams that have been analyzed by the Colorado DNR for this aspect of dam incident flooding. The high, moderate, or low designations were assigned by DNR by dividing the total number of ranked dams across the state into thirds. Should there be a need to relieve pressure on the dam (e.g., if there was excess inflow from high rains or snowmelt) releases from the dams ranked as high or moderate may result in downstream flooding. The Lookout Mountain Dam referenced above has been identified as also having risk of non-failure inundation.

Table C-12 Dams with Risk of Non-Failure Inundation

Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
070104	Lookout Mountain	2-8" DIP	5	343	Low

Source: State of Colorado Department of Natural Resources, Dam Safety Division

No low head dams have been identified in the City of Golden.

Estimating Potential Losses

Table C-13 shows that Golden has 522 parcels (8.9% of total) that are potentially exposed with a total value of \$576 Million. Of the parcels exposed, 394 are residential properties potentially exposing 883 residents to dam inundation hazards.

Table C-13 Dam Inundation Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	65	92	\$68,831,101	\$68,831,101	\$137,662,202	
Exempt	12	13	\$42,696,376	\$42,696,376	\$85,392,752	
Industrial	3	3	\$3,441,445	\$5,162,168	\$8,603,613	
Mixed Use	48	54	\$17,585,066	\$17,585,066	\$35,170,132	
Residential	394	410	\$206,211,981	\$103,105,991	\$309,317,972	883
Total	522	572	\$338,765,969	\$237,380,701	\$576,146,670	883

Source: Jefferson County Assessor, National Inventory of Dams, NHD

Critical Facilities

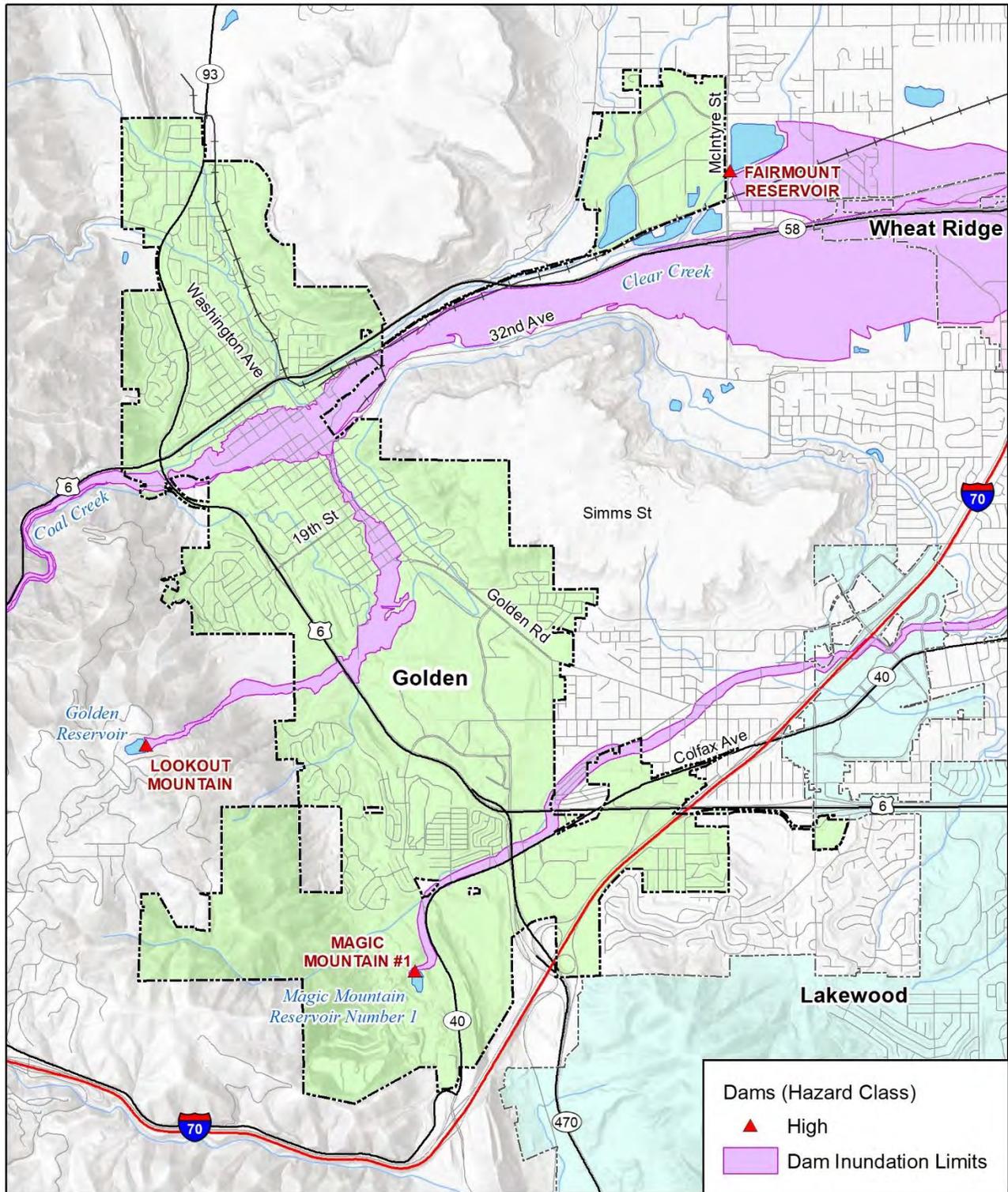
There are 30 critical facilities identified in areas at risk of dam inundation in the City of Golden, shown in Table C-14. Communication towers, bridges, and Tier II hazmat facilities are listed most often as exposed to dam inundation hazards.

Table C-14 Critical Facilities Potentially at Risk of Dam Inundation, by FEMA Lifeline

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	7
	Microwave Service Towers	3
Energy	Power Plant	1
Food, Water, Shelter	Wastewater Plant	1
	Water Facility	1
Hazardous Material	RMP Facility	1
	Tier II Facility	5
Safety and Security	EOC	1
	Fire Station	1
	Law Enforcement	1
	School	1
Transportation	Bridge	6
Total		30

Source: National Inventory of Dams, HIFLD and CERC

Figure C-4 Dam Inundation Areas in the City of Golden



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety

0 1 2 Miles



C.5.2 Flood

Past Events

1896 Flood – This flood, profiled in the base plan, struck the towns of Morrison, Golden, and Mt. Vernon. The *Golden Globe* reported:

“Great cloud bursts came down from Mt. Lookout, Mt. Zion, North Table Mountain and from the steeps that enclose Tucker’s Gulch. What is a cloud burst? you ask. It is a quick release by two clouds meeting, of every drop of water they contain, as sudden as if they had been emptied from a pail. Imagine a volume of water perhaps twenty feet high hundreds of feet long, and wide, suddenly emptied on a mountain slope. To those who saw the rush of waters, the sight will forever remain. Over the crest of North Table Mountain, the water poured as it pours over Niagara Falls. Down the slopes of the mountains came the great wave looking like a giant roll of white mist, rolling boulders that weighed tons, as if they were spools of thread. The mighty roar as these huge monsters hurried down after their victims, was a sound besides which the roar of the Niagara Falls was dwarfed. Every reader of the newspapers knows the rest. It was awful, majestic, unreasoning, and un pitying power before which human strength and human ingenuity was as a straw before the cyclone.”

On Tucker Gulch where the western houses of Garden Street stand today Laura Edwards, 34 and a mother of two small children, had gone out to milk the cows at the family’s barn, and had no chance to escape. Downstream Andrew and Anna Johnson, a Swedish immigrant couple in their early 70s, had sat down to supper at their little cottage overlooking the gulch just back of the Treffeisen Building at the northeast corner of 10th and Ford. They too never had a chance. The photo in Figure C-5 from shortly after showed no sign any house had ever been there where 3 maps had shown it before, one from earlier that same year.

Figure C-5 The destruction of the 1896 Flood at 10th Street and Tucker Gulch



Source: Golden Pioneer Museum

Elsewhere in Golden, Clear Creek took out the Ford Street Bridge which had been inundated by many houses on lower 11th Street, after it had already twisted apart miles of railroad track in the canyon upstream. Between it and the waters of Tucker Gulch diverted by the Glass Works down Washington

Avenue, Golden's first building, the Boston Building at today's Parfet Park, was dislodged. From here the immense storm wreaked havoc upon the South Platte, Arkansas, and Rio Grande rivers, where it caused more flooding and destruction in Denver and elsewhere but fortunately claimed no more lives. At Golden the flooding continued a second day, but all escaped that too.

2013 Floods – On November 12, 2013 Golden Police received a weather alert from the National Weather Service concerning a flood warning. The alert described flood stage as 10 feet with an expectation for water to rise to 11.5 feet by the next morning. It mentioned water overflowing into the "RV Park near highways 6 and 58."

Decisions were made to close and evacuate the Clear Creek RV Park, prepare to sandbag, or create a berm to protect the city water treatment plant and to move police department vehicles from the city hall lot, dispersing them to separate sides of Clear Creek.

After the RV Park notifications were made, police dispatch sent out a CodeRED notification alerting citizens about possible flooding. The notification was sent to registered houses and numbers from the north side of 10th Street to the south side of 9th Street between Washington Avenue and Maple Streets. The event was short lived; water did rise into the RV Park but caused no damage

On December 10, 2013 city officials ordered a number of residents along Clear Creek to evacuate amid fears of flooding. Mandatory evacuations were ordered after melting ice dams unleashed a wall of water estimated at 4-feet high. Video taken of the initial break showed the rushing water carrying logs and large chunks of ice. Water began rising Tuesday as ice dams broke due to warmer weather. Officials at the National Weather Service in Boulder said the waters of Clear Creek rose 3 feet in 15 minutes. Evacuations were ordered for the Clear Creek RV Park and residents of a condominium complex on 6th Avenue along the creek. Evacuees were sent to the Golden Community Center.

The RV park is at the end of 10th Street and is open year-round, with 22 full hook-ups and about 12 people may have been at the park at the time of the evacuation.

Authorities contacted residents, including the MillerCoors brewery, via a CodeRed warning, sent to condominiums on 6th Avenue along the creek. The rushing waters dissipated as they left the steeper part of the canyon and caused no damage to the City of Golden.

Estimating Potential Losses

Figure C-6 depicts the FEMA flood zones (1% annual chance and 0.2% annual chance) as well as all the at-risk properties in Golden.

Table C-15 shows the parcels and buildings values at risk to the 1% annual chance flood. For this analysis, content values were estimated based on prevailing land use and a multiplier was applied to building and content values to estimate losses to each. See Section 4 Hazard Profiles for details on methodology. According to the analysis, 124 buildings (84 of which are residential) are at risk, totaling \$23.5 million of damage to buildings and contents. This represents 1.8% of the buildings in the City. Note that this analysis does not account for properties which may have been built in accordance with local floodplain regulations and mitigated to the 1% annual chance flood.

Table C-15 City of Golden Properties At-Risk to 1% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss (25%)	Population
Commercial	16	26	\$10,064,295	\$10,064,295	\$20,128,590	\$5,032,148	
Exempt	3	3	\$5,775,725	\$5,775,725	\$11,551,450	\$2,887,863	
Industrial	7	8	\$1,990,530	\$2,985,795	\$4,976,325	\$1,244,081	
Mixed Use	3	3	\$1,234,510	\$1,234,510	\$2,469,020	\$617,255	
Residential	49	84	\$36,577,333	\$18,288,667	\$54,866,000	\$13,716,500	188
Total	78	124	\$55,642,393	\$38,348,992	\$93,991,385	\$23,497,846	188

Source: Wood analysis of Jefferson County Assessor's Data

Table C-16 shows the parcels and buildings at risk to the 0.2% annual chance flood. According to the analysis, 256 buildings (219 of which are residential) are at risk, totaling \$59.1 million of damage to buildings and contents over and above the 1% scenario.

Table C-16 City of Golden Buildings At-Risk to 0.2% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss (25%)	Population
Commercial	19	19	\$29,186,056	\$29,186,056	\$58,372,112	\$14,593,028	
Exempt	2	2	\$4,019,419	\$4,019,419	\$8,038,838	\$2,009,710	
Industrial	1	1	\$167,454	\$251,181	\$418,635	\$104,659	
Mixed Use	15	15	\$4,386,252	\$4,386,252	\$8,772,504	\$2,193,126	
Residential	208	219	\$107,239,961	\$53,619,981	\$160,859,942	\$40,214,985	491
Total	245	256	\$144,999,142	\$91,462,889	\$236,462,031	\$59,115,508	491

Source: Wood analysis with Jefferson County Assessor's Data

Critical Facilities

There are 18 critical facilities in the 1% annual chance flood zone, 6 of which are bridges (Table C-17). There are an additional 6 additional critical facilities in the 0.2% annual chance flood zone (Table C-18). Together this represents 15.7% of the City's critical facilities.

Table C-17 Golden Critical Facilities in 1% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
	Microwave Service Towers	3
Energy	Power Plant	1
Food, Water, Shelter	Wastewater Plant	1
	Water Facility	1
Hazardous Material	RMP Facility	1
	Tier II	3
Safety and Security	Government Facility	1
Transportation	Bridge	6
Total		18

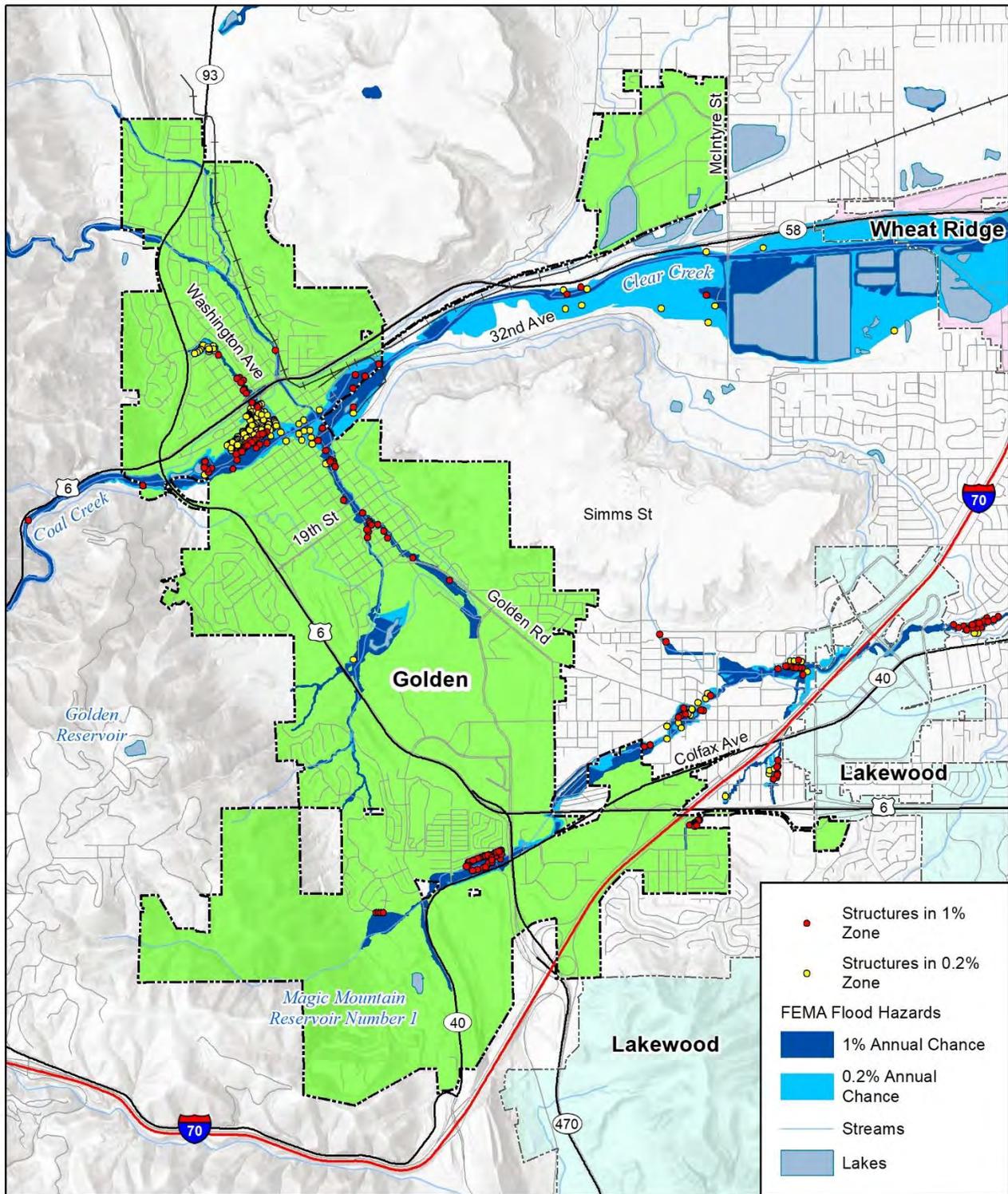
Source: HIFLD and CERC

Table C-18 Golden Critical Facilities in 0.2% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
Hazardous Material	Tier II	1
Safety and Security	EOC	1
	Fire Station	1
	Law Enforcement	1
Transportation	Bridge	1
Total		6

Source: HIFLD and CERC

Figure C-6 City of Golden Flood Hazards and At-Risk Properties



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

National Flood Insurance Program

The City of Golden has participated in the National Flood Insurance Program (NFIP) since 1985. NFIP insurance data shows that as of January 2021 there are 94 flood insurance policies in force in the City providing \$26 million of coverage. There have been 14 historical claims for flood losses, totaling \$48,938. There are no repetitive loss structures or severe repetitive loss structures as defined by the NFIP. In addition to participating in the NFIP, Arvada is also a Community Rating System (CRS) participant and currently a Class 7 CRS community.

C.5.3 Geologic Hazards

Past Events

2015 Mudslide – In May 2015, a significant sized mudslide came off the west side of North Table Mesa and into the backyard of a home on in the Mesa Meadows neighborhood. Golden Fire, Golden PD, Golden Utilities, and Coors all worked together in the recovery effort. The water came from an old irrigation type ditch that runs along the west side of the hill a short distance away from the residences. The ditch along the hill was saturated from the heavy rains and a sizeable part of the mountain slid down the hill, taking out the fence, landscaping, and a basketball hoop in the backyard.

Golden Fire was able to stem the flow of water to keep it out of the house and direct it between the house to the street. They were also able to shore up and partially dig out the problem area of the ditch which prevented any more mud from sloughing off.

Coors supplied a semi-truck filled with pre-made sandbags delivered right to the driveway. Utilities came out and assisted with a front end loader to haul sandbags up the hill and do some additional mitigation to the ditch.

Estimating Potential Losses

Golden has some exposure to geologic hazards including landslide, slope failure, subsidence, and dipping bedrock. Some of these areas are presently undeveloped and on the western limits of the City. Rockfall areas are around the slopes of North and South Table Mountains which have some residential development potentially at risk. See the map in Figure C-7. Specific structures at risk from specific geologic hazards are detailed in the following tables. Methodology for this table can be found in Section 4.

Table C-19 City of Golden Landslide Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Exempt	1	1	\$47,800	\$47,800	\$95,600
Industrial	1	1	\$515,630	\$773,445	\$1,289,075
Mixed Use	1	2	\$51,996,229	\$51,996,229	\$103,992,458
Residential	292	292	\$162,397,380	\$81,198,690	\$243,596,070
Total	295	296	\$214,957,039	\$134,016,164	\$348,973,203

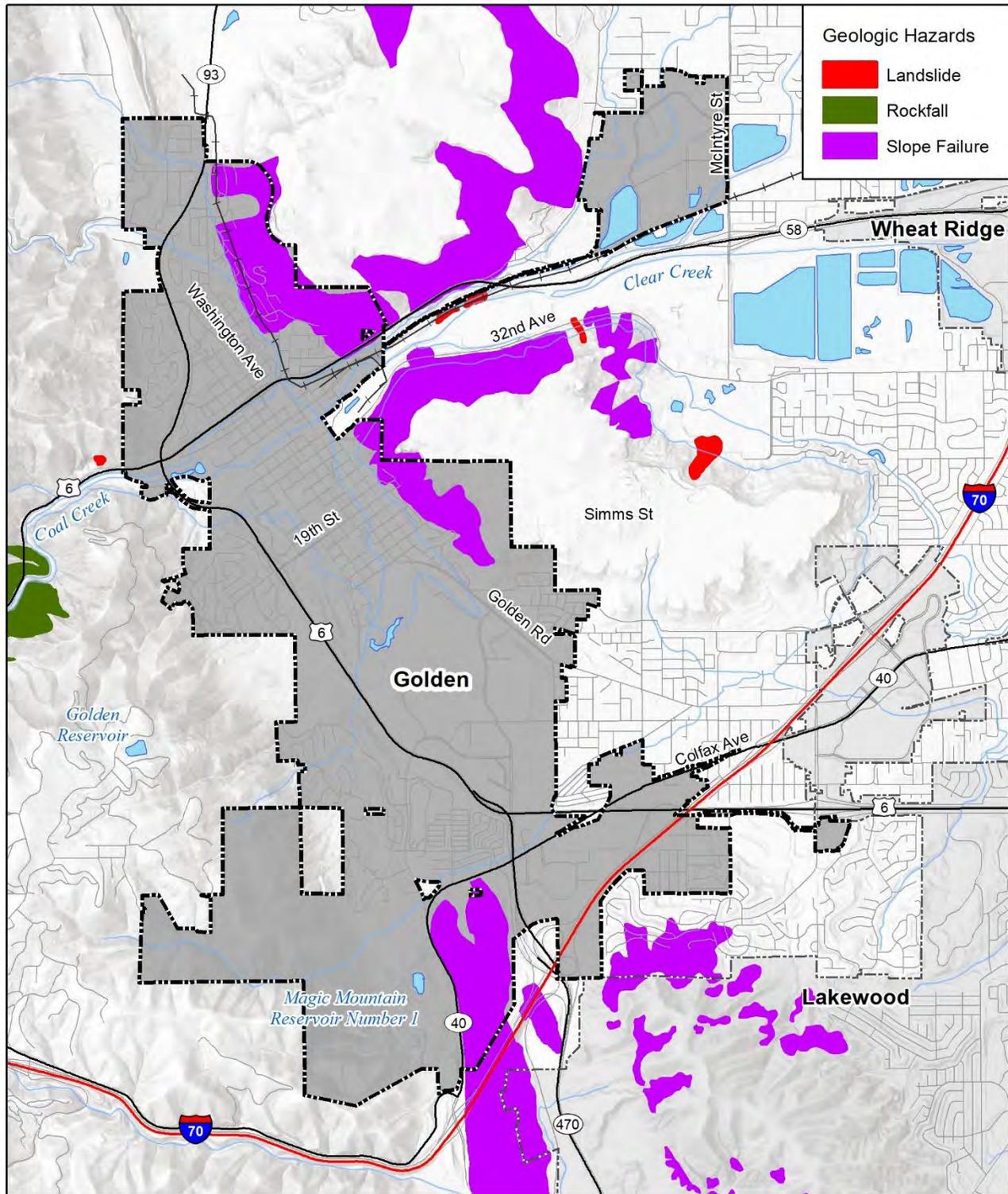
Source: Wood analysis of Jefferson County GIS and Assessor's Data

Table C-20 City of Golden Subsidence Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Agriculture	1	1	\$35,437	\$35,437	\$70,874
Commercial	35	45	\$31,544,275	\$31,544,275	\$63,088,550
Exempt	4	15	\$47,915,162	\$47,915,162	\$95,830,324
Industrial	52	53	\$17,255,581	\$25,883,372	\$43,138,953
Mixed Use	1	3	\$51,996,229	\$51,996,229	\$103,992,458
Residential	332	350	\$199,095,029	\$99,547,515	\$298,642,544
Total	425	467	\$347,841,713	\$256,921,989	\$604,763,702

Source: Wood analysis of Jefferson County GIS and Assessor's Data

Figure C-7 City of Golden Landslide & Rockfall Risk Map



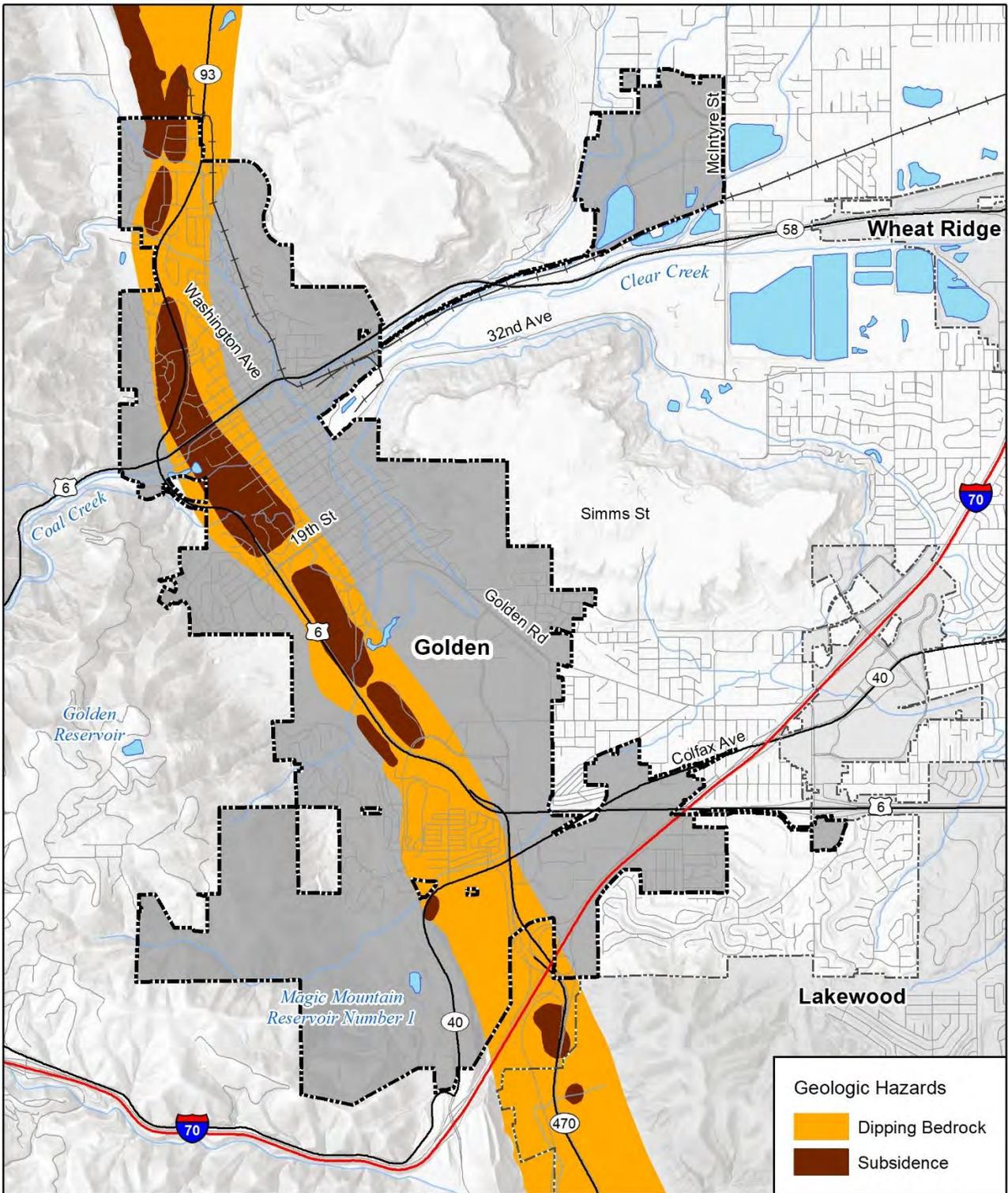
Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles

N



Figure C-8 City of Golden Areas at Risk of Subsidence and Dipping Bedrock



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles



Table C-21 City of Golden Dipping Bedrock Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Agriculture	1	1	\$35,437	\$35,437	\$70,874
Commercial	78	99	\$115,741,263	\$115,741,263	\$231,482,526
Exempt	15	31	\$104,465,968	\$104,465,968	\$208,931,936
Industrial	86	89	\$52,589,441	\$78,884,162	\$131,473,603
Mixed Use	9	17	\$62,980,881	\$62,980,881	\$125,961,762
Residential	1,786	2,562	\$831,940,022	\$415,970,011	\$1,247,910,033
Total	1,975	2,799	\$1,167,753,012	\$778,077,722	\$1,945,830,734

Source: Wood analysis of Jefferson County GIS and Assessor's Data

Golden's proximity to the Golden Fault as a potential, though unlikely, earthquake source makes it more vulnerable to earthquake damage. Golden's downtown historic district has a number of un-reinforced masonry buildings that are particularly vulnerable to earthquake shaking.

Critical Facilities

Of the critical facilities identified in the City of Golden, 6 are potentially at risk of landslides, 15 are at risk of subsidence, and 39 are at risk of dipping bedrock.

Table C-22 Golden Critical Facilities at Risk of Landslides

FEMA Lifeline	Critical Facility Type	Count
Communications	Microwave Service Towers	3
Hazardous Material	Household Hazardous Waste	1
Safety and Security	Government Facility	2
	Total	6

Source: HIFLD and CERC

Table C-23 Golden Critical Facilities at Risk of Subsidence

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	4
	Microwave Service Towers	5
Food, Water, Shelter	Water Facility	1
Safety and Security	Government Facility	2
	School	1
Transportation	Bridge	2
	Total	15

Source: HIFLD and CERC

Table C-24 Golden Critical Facilities at Risk of Dipping Bedrock

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	9
	Microwave Service Towers	9
Food, Water, Shelter	Water Facility	1
Hazardous Material	Household Hazardous Waste	1
	Tier II	1
Health and Medical	Nursing Home	2
Safety and Security	EOC	1
	Government Facility	6
	Law Enforcement	1
	School	2

FEMA Lifeline	Critical Facility Type	Count
Transportation	Bridge	6
	Total	39

Source: HIFLD and CERC

C.5.4 Wildfire

With its location at the Rocky Mountain foothills, Golden does have risk to wildfires, both from grass fires on the open spaces at the western edge of the City and along the flanks of the Table Mountains, and from forest fires in the foothills, see Figure C-10.

Past Events

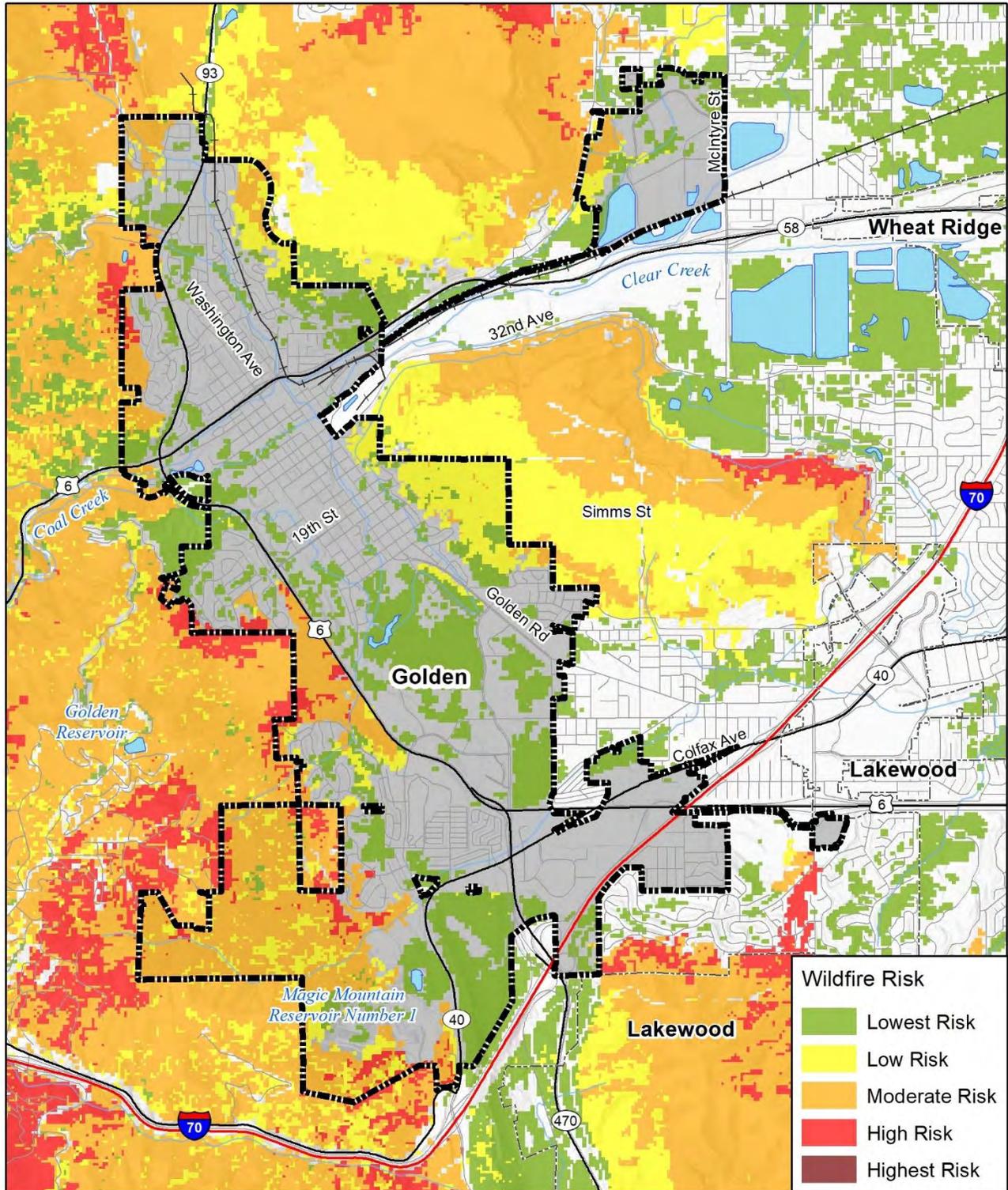
2011 Indian Gulch Fire – The Indian Gulch Fire, although not within the city limits of Golden had a significant impact on the Mountain Ridge neighborhood in Golden.

The fire was reported to the Golden Fire Department on March 20, 2011. The fire was originally reported as a 5-acre wildfire. Due to the rapid increasing size of the fire, direction of travel, wind, and other weather conditions it was decided by the Golden fire Department that a prepare to evacuate notice be communicated to the residents of Mountain Ridge. The fire was finally contained on March 25, 2011 after consuming nearly 2,000 acres on Mount Galbraith.

Figure C-9 Indian Gulch Fire from Downtown Golden



Figure C-10 City of Golden Wildfire Risk Map



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado State Forest Service COWRAP

0 1 2 Miles



Estimating Potential Losses

Parcel analysis was conducted using GIS to analyze where parcels, buildings counts, property types and content values intersected with the wildfire hazards zones defined by the Colorado Forest Atlas, from highest to lowest risk. In addition to parcel data, an address point layer was also used to estimate building locations. Results are shown in Table C-25 - Table C-28. Based on this analysis Golden has 391 structures at risk of wildfire, 98 of which are at moderate or high risk. Residential property types have the greatest number of parcels at risk of wildfire, in addition there are 757 residents exposed to wildfire risk.

Table C-25 High Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	2	2	\$8,971,394	\$8,971,394	\$17,942,788	
Exempt	1	1	\$19,600	\$19,600	\$39,200	
Mixed Use	1	1	\$79,440	\$79,440	\$158,880	
Residential	12	12	\$5,615,461	\$2,807,731	\$8,423,192	27
Total	16	16	\$14,685,895	\$11,878,165	\$26,564,060	27

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table C-26 Moderate Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	5	5	\$14,962,510	\$14,962,510	\$29,925,020	
Exempt	1	2	\$18,084,856	\$18,084,856	\$36,169,712	
Industrial	6	6	\$604,500	\$906,750	\$1,511,250	
Mixed Use	1	1	\$779,340	\$779,340	\$1,558,680	
Residential	68	68	\$36,620,694	\$18,310,347	\$54,931,041	152
Total	81	82	\$71,051,900	\$53,043,803	\$124,095,703	152

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table C-27 Low Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	3	3	\$5,639,204	\$5,639,204	\$11,278,408	
Exempt	1	1	\$47,800	\$47,800	\$95,600	
Industrial	2	2	\$5,281,682	\$7,922,523	\$13,204,205	
Residential	23	23	\$11,702,775	\$5,851,388	\$17,554,163	52
Total	29	29	\$22,671,461	\$19,460,915	\$42,132,376	52

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table C-28 Lowest Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Agriculture	1	1	\$35,437	\$35,437	\$70,874	
Commercial	7	7	\$20,090,608	\$20,090,608	\$40,181,216	
Exempt	6	9	\$66,285,324	\$66,285,324	\$132,570,648	
Industrial	11	11	\$37,075,995	\$55,613,993	\$92,689,988	

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Mixed Use	1	1	\$51,996,229	\$51,996,229	\$103,992,458	
Residential	233	235	\$183,279,507	\$91,639,754	\$274,919,261	526
Total	259	264	\$358,763,100	\$285,661,344	\$644,424,444	526

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Critical Facilities

The City of Golden has a total of 21 critical facilities at moderate to lowest risk to wildfire. The following table shows the results of the GIS analysis and is organized by wildfire risk and Lifeline. Refer to section 4.3.16 of the Base Plan for more information on the methodology of the GIS analysis.

Table C-29 City of Golden Critical Facilities At-Risk to Wildfire by Type

Wildfire Risk	FEMA Lifeline	Critical Facility Type	Count
Moderate	Communications	Land Mobile Private Towers	1
		Microwave Service Towers	4
Low	Communications	Land Mobile Private Towers	1
		Microwave Service Towers	1
Lowest	Communications	Land Mobile Private Towers	7
		Microwave Service Towers	4
	Hazardous Material	Household Hazardous Waste	1
	Transportation	Aircraft Facility	1
		Bridge	1
Total			21

Source: HIFLD and CERC

C.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, lightning, tornado, and windstorm, the entire building inventory and population in the City is potentially exposed. That is the reason for the asset inventory provided in Section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory. Golden's location at the base of the foothills makes it more prone to high wind events than most other communities in this plan.

C.6 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. Golden's regulatory, administrative, and technical, and fiscal mitigation capabilities are summarized in Section 2.7 of the Base Plan. Additional details on specific capabilities are discussed below.

National Flood Insurance Program

The City of Golden joined the National Flood Insurance Program (NFIP) on May 15, 1985. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. Golden's initial Flood Insurance Rate Map became effective on 5/15/85. The most current Digital Flood Insurance Rate Maps were updated and became effective on 12/50/2019. As of January 2021, there were 94 NFIP policies in force in Golden, with a total coverage of \$26,368,500; this represents an addition of 1 policy and \$739,500 in coverage since 2015. In Golden, there have been 14 historical claims for flood losses totaling \$48,938. At the time this plan was developed there were no repetitive or severe repetitive loss structures as defined by the NFIP.

The City also joined the Community Rating System (CRS) on October 1, 1996. The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in communities that provide extra measures of flood above the minimum NFIP requirements. As of January 2021, Golden had a CRS class rating of 7 (one a scale of 1-10, 1 being the best). This is an improvement over the previous class rating of 9 in 2009. This rating provides a 15 percent discount for policyholders within a special flood hazard area (SFHA) and a 5 percent discount for those outside of an SFHA.

Golden's municipal code has been updated to reflect this change (Title 15, Chapter 60). The DFIRMS have been used for floodplain management and risk assessment by the City.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Golden activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

City of Golden Comprehensive Plan 2017

The City's comprehensive plan is a guide to help the City make decisions and establish its future direction. The goals, policies, and strategies and actions contained within the plan cover a broad range of subjects matter related to services, issues, and geographic areas within Golden. Combined, these elements serve to direct future policy decisions to preserve vital community attributes and service levels and manage growth.

None of the goals or strategies in the plan specifically address hazard mitigation. The following goals and strategies are related:

Value Theme B – Active outdoors and entertainment

Goal 4: We will protect Clear Creek as a heart & soul element of Golden and will actively preserve and enhance its character for future generations.

- Strategy 4.1 Maintain and improve water quality of flows entering the creek by inspecting outfalls and enforcing illegal dumping regulations.
- Strategy 4.2: Refine and implement the Clear Creek Corridor Master Plan to enhance recreational opportunities and preserve the creek for future generations.
- Strategy 4.3: Consider the effects on Clear Creek of any adjacent project, development or neighborhood planning effort that could impact the character of the corridor.
- Strategy 4.4 Land use cases shall be evaluated according to the following considerations. If the site is adjacent to or less than a quarter mile from Clear Creek, how will the creek corridor be impacted, how will water quality be improved or impacted, and what can be done to provide good access and connections to the creek?

Goal 6: Preserve the natural beauty of unique geologic features, extended stretches of the foothills, riparian corridors throughout the community, and unbroken stretches of natural environments that define Golden.

- Strategy 6.3: Identify features in Golden that should be protected. Features to be protected and preserved include geological formations, plants and wildlife, waterways, quiet soundscapes and the night sky.

Value Theme C – Safe, clean and quiet neighborhoods

Goal 1: Golden will be a place where we can go anywhere at any time and feel safe.

- Strategy 1.6: Improve the water quality entering waterways and reduce the amount of runoff through use of bio-swales, rain gardens, porous pavement and other techniques approved by Urban Drainage and allowed by Municipal Code.

Value Theme E – Convenience and amenities

Goal 1: Value the proximity to Denver and the mountains, while maintaining our geographic separateness.

- Strategy 1.1: Continue working to acquire open space around the edges of the City to create a buffer between Golden and other communities and preserve easy access to surrounding nature.

Municipal Code – All sections adopted in the City of Golden

Title 15 Building and Construction

Chapter 15.60 – Floodplain Standards and Regulations (Ord. 1968, 2014)

Findings of fact.

1. The flood hazard areas of the City of Golden are subject to periodic inundation, which can result 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 health, safety and general welfare of the public.
2. 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, flood proofed or otherwise protected from flood damage.

15.60.030 - General provisions.

(a) *Lands to which this chapter applies.* The chapter shall apply to all special flood hazard areas and areas removed from the floodplain by the issuance of a FEMA Letter of Map Revision Based on Fill (LOMR-F) within the jurisdiction of the City of Golden, Colorado.

15.60.040 - Administration.

(a) *Designation of the floodplain administrator.* The city engineer or his/her designee is hereby appointed as floodplain administrator to administer, implement and enforce the provisions of this chapter and other appropriate sections of 44 CFR (National Flood Insurance Program Regulations) pertaining to floodplain management.

15.60.050 - Provisions for flood hazard reduction.

(a) *General standards.* In all special flood hazard areas, the following provisions are required for all new construction and substantial improvements:

(b) *Specific standards.* In all special flood hazard areas where base flood elevation data has been provided as set forth in: subsection [15.60.030\(b\)](#), Golden Municipal Code; subsection [15.60.040\(b\)\(7\)](#), Golden Municipal Code; or subsection (g) of this section, the following provisions are required:

(1) *Residential construction.* New construction and substantial improvement of any residential structure shall have the lowest floor (including basement), electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork), elevated to one foot above the base flood elevation. Upon completion of the structure, the elevation of the lowest floor, including basement, shall be certified by a registered Colorado professional engineer, architect, or land surveyor. such certification shall be submitted to the floodplain administrator.

(2) *Nonresidential construction.* With the exception of critical facilities, outlined in subsection (h) of this section, new construction and substantial improvements of any commercial, industrial, or other nonresidential structure shall either have the lowest floor (including basement), electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork), elevated to one foot above the base flood elevation or, together with attendant utility

and sanitary facilities, be designed so that at one foot above the base flood elevation 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.

(3) *Enclosures*. New construction and substantial improvements, with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access, or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.

(4) *Manufactured homes*. All manufactured homes that are placed or substantially improved within zones A1-30, AH, and AE on the community's FIRM on sites: Outside of a manufactured home park or subdivision; in a new manufactured home park or subdivision; in an expansion to an existing manufactured home park or subdivision; or in an existing manufactured home park or subdivision on which manufactured home has incurred "substantial damage" as a result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home, electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork), are elevated to one foot above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

(c) *Standards for areas of shallow flooding (AO/AH zones)*. Located within the special flood hazard area established in subsection [15.60.030\(b\)](#) Golden Municipal Code, are areas designated as shallow flooding. These areas have special flood hazards associated with base flood depths of one to three feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow; therefore, the following provisions apply:

(1) *Residential construction*. All new construction and substantial improvements of residential structures must have the lowest floor (including basement), electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork), elevated above the highest adjacent grade at least one foot above the depth number specified in feet on the community's FIRM (at least three feet if no depth number is specified). Upon completion of the structure, the elevation of the lowest floor, including basement, shall be certified by a registered Colorado Professional Engineer, architect, or land surveyor. Such certification shall be submitted to the floodplain administrator.

(2) *Nonresidential construction*. With the exception of critical facilities, outlined in subsection [15.60.050\(h\)](#), Golden Municipal Code, all new construction and substantial improvements of nonresidential structures, must have the lowest floor (including basement), electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork), elevated above the highest adjacent grade at least one foot above the depth number specified in feet on the community's FIRM (at least three feet if no depth number is specified), or together with attendant utility and sanitary facilities, be designed so that the structure is watertight to at least one foot above the base flood level one foot above the depth number specified in feet on the community's FIRM (at least three feet if no depth number is specified) with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy. A registered Colorado Professional Engineer or architect shall submit a certification to the floodplain administrator that the standards of this section, as set forth in subsection [15.60.040\(c\)](#), Golden Municipal Code, are satisfied. Within zones AH or AO, adequate drainage paths around structures on slopes are required to guide floodwaters around and away from proposed structures.

(d) *Floodways*. Floodways are administrative limits and tools used to regulate existing and future floodplain development. The State of Colorado has adopted floodway standards that are more stringent than the FEMA minimum standard (see definition of floodway in [section 15.60.020](#), Golden Municipal Code). Located within special flood hazard area established in subsection [15.60.030\(b\)](#), Golden Municipal Code, are areas designated as floodways. Since the floodway is an extremely hazardous area

due to the velocity of floodwaters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

- (1) Encroachments are prohibited, including fill, new construction, substantial improvements and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed by a licensed Colorado Professional Engineer and in accordance with standard engineering practice that the proposed encroachment would not result in any increase (requires a no-rise certification) in flood levels within the community during the occurrence of the base flood discharge.
 - (2) If subsection [15.60.050\(d\)\(1\)](#), Golden Municipal Code is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of this section.
 - (3) Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Regulations, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a CLOMR and floodway revision through FEMA.
- (g) *Standards for subdivision proposals.*
- (1) All subdivision proposals including the placement of manufactured home parks and subdivisions shall be reasonably safe from flooding. If a subdivision or other development proposal is in a flood prone area, the proposal shall minimize flood damage.
 - (2) All proposals for the development of subdivisions including the placement of manufactured home parks and subdivisions shall meet floodplain development permit requirements of subsection [15.60.030\(c\)](#), Golden Municipal Code; and the provisions of subsection [15.60.040\(c\)](#) of the Golden Municipal Code.
 - (3) Base flood elevation data shall be generated for subdivision proposals and other proposed development including the placement of manufactured home parks and subdivisions which is greater than 50 lots or five acres, whichever is lesser, if not otherwise provided pursuant to subsection [15.60.030\(b\)](#), Golden Municipal Code or subsection [15.60.040\(b\)](#) Golden Municipal Code.
 - (4) All subdivision proposals including the placement of manufactured home parks and subdivisions shall have adequate drainage provided to reduce exposure to flood hazards.
 - (5) All subdivision proposals including the placement of manufactured home parks and subdivisions shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage.
- (h) *Standards for critical facilities.* A critical facility is a structure or related infrastructure, but not the land on which it is situated, as specified in Rule 6 of the Rules and Regulations for Regulatory Floodplains in Colorado, that if flooded may result in significant hazards to public health and safety or interrupt essential services and operations for the community at any time before, during and after a flood.
- (2) *Protection for critical facilities.* All new and substantially improved critical facilities and new additions to critical facilities located within the special flood hazard area shall be regulated to a higher standard than structures not determined to be critical facilities. For the purposes of this chapter, protection shall include one of the following:
 - (a) Location outside the special flood hazard area; or
 - (b) Elevation of the lowest floor or floodproofing of the structure, together with attendant utility and sanitary facilities, to at least two feet above the base flood elevation.
 - (3) *Ingress and egress for new critical facilities.* New critical facilities shall, when practicable as determined by the City of Golden Public Works Department have continuous non-inundated access (ingress and egress for evacuation and emergency services) during a 100-year flood event.

Residential Code Chapter 15.40.080 - IRC Section R403.1.9.

(Ord. 1931, 2013; Ord. 1855, 2009; Ord. 1754, § 11, 2006)

IRC Section R403.1.9 (Designated Dipping Bedrock Area) is enacted to read as follows:

Designs of foundations required to be designed by a registered design professional and to be installed in the designated Dipping Bedrock areas, as identified by the Jefferson County Colorado "Designated Dipping Bedrock Area" map dated October 20, 1999, shall consider, and incorporate accepted engineering practices and procedures so as to mitigate the potential adverse effects of such Dipping Bedrock on structures, as determined necessary by a registered design professional.

Title 17 Subdivisions – The Subdivision Ordinance of the City of Golden, Colorado is adopted to:

- Protect and provide for the health, safety, and general welfare of the City of Golden;
- Promote the orderly growth of the city in concert with the comprehensive master plan;
- Provide adequate and effective public utility systems;
- Provide for the proper distribution of population and supportive land uses;
- Provide for the proper design and construction of the transportation system consistent with the adopted Thoroughfare Plan;
- Establish standards for design and set forth the procedures for the subdivision and re-subdivision of land in property relation to the type of land use and population to be served;
- Ensure the use of proper legal descriptions, surveying, and monument of subdivided land.

This Subdivision Ordinance is to be enforced and interpreted in concert with the zoning ordinance of the City of Golden and other applicable regulations, ordinances, codes, and rules. All plats and plans submitted shall be in a form which satisfies this ordinance, the zoning ordinance, and all other applicable ordinances and regulations. (Ord. 1152, 1992; Ord. 676 § 2 (1-3), 1973).

Title 18 Planning and Zoning - These regulations are enacted for the purposes of promoting the health, safety, convenience, order, prosperity, and welfare of the present and future inhabitants of the City of Golden through growth management; for adequate and convenient open spaces for traffic, utilities, access of firefighting apparatus, recreation, light, air, and solar access; and for the avoidance of congestion of population, and other public requirements. This section also includes criteria for expansion or inclusion of public parks and trails for new or expanded development.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

2008 City of Golden Parks and Recreation Department Master Plan – The City of Golden Parks and Recreation Master Plan is a guiding document used by elected and appointed officials to determine potential actions. The Master Plan documents, classifies, and inventories the parks, trails, and recreation facilities currently owned and maintained by the City of Golden Parks and Recreation Department. The Master Plan also lays out standards for future developments' inclusion of open space and public recreation areas.

Bicycle Planning – Integrated into the Comprehensive Plan 2011 - The City of Golden's bicycle mobility strategy is integrated into the multi-modal transportation section of the City's Comprehensive plan, updated in 2011.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

Snow Removal - The Street Division is responsible for snow and ice control maintenance of approximately 230 lane miles of asphalt pavement. All city streets are maintained during each storm as required. Snow and ice control services are provided for community safety purposes first and for convenience secondarily. The snow and ice control plan is revised annually.

Fire Plans - The City of Golden has a Community Wildfire Protection Plan (CWPP) last updated in 2007 and scheduled to be updated in 2021. The CWPP was developed for the City of Golden with guidance and support from Jefferson County Division of Emergency Management, Colorado State Forest Service, and the United States Forest Service. This CWPP supplements the Jefferson County Annual Operation Plan and the Jefferson County Fire Plan. Initial response to all fire and medical and associated emergencies is the responsibility of the City of Golden. The CWPP profiles the City of Golden by outlining its specific risks and then provides a number of suggested actions (Section 5.2) to achieve reduction of vulnerabilities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

The City's Communication Manager is responsible for all aspects of the City's public communications activities and operations, including strategic and crisis communications, public relations, marketing, audio-visual production, publications production and event planning. The Communications Manager directs and develops programs to increase citizen understanding of municipal operations and that deliver effective two-way communications, including citizen, media relations, public relations, marketing, intergovernmental and interdepartmental relations. The Communications Manager serves as advisor to the City Manager, Council and staff in developing and fostering successful relationships with the community, media and other governments via effective day-to-day communications.

Other Capabilities

Golden has links on its website to real-time flood gauge information at the Mile High Flood District; no changes planned.

Golden sends an annual Flood Protection Brochure to properties near and in the floodplain as part of our participation in the CRS program; no changes planned.

Golden has placed FEMA Technical Bulletins in the Golden Library—these bulletins cover flood protection techniques and flood resistant construction; required by CRS, no changes planned.

Golden's 2015 Flood Protection Ordinance prohibits development in the floodway and provides strict guidelines for floodplain development; no changes planned.

Per Golden's ordinance, any changes to Critical facilities must result in protection to the 500-year storm level; no changes planned.

Golden continues its participation in the NFIP; we just had our ISO audit in 2020 to verify compliance; no changes planned.

Golden continues its participation in the CRS; we just had our ISO audit in 2020 to verify compliance and anticipate retaining our CRS rating of "7"; plan on continuing participation in CRS.

C.6.1 Opportunities for Enhancement

Based on the capability assessment, Golden has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the City to expand or improve on these policies and programs to further protect the community. The City has for some time identified the need for a full-time, dedicated civilian Emergency Manager to improve their capability to engage in comprehensive emergency management, however, the position is still in the proposal stage. Table 2-15 in the Base Plan shows the potential financial benefits from increasing the City's Community Rating System class. Other future improvements may be the incorporation of risk and hazard information into future comprehensive plan updates, currently in progress.

C.7 Plan Implementation and Maintenance

Golden has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the City will continue public participation in the plan maintenance process.

C.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The City of Golden recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, information from the 2016 Jefferson County Hazard Mitigation Plan is directly incorporated into the City's Emergency Operations Plan. The 2021 Hazard Mitigation Plan will in turn be incorporated into the City's updated Emergency Operations Plan.

C.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Golden Police Captain will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. Golden Fire Chief and Golden City Engineer will also be responsible for representing the City on future Jefferson County HMPC meetings, and for coordination with city staff and departments during plan updates. The City, Fire District, Police Department, and Public Works will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by City Council.

This 2021 Hazard Mitigation Plan will be used in all subsequent updates to the City of Golden's comprehensive plan and any other related planning efforts.

The City of Golden will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

C.8 Mitigation Actions

The City of Golden has adopted the hazard mitigation goals and objectives developed by the Planning Team and described in Section 6.2 of the Base Plan.

The City had two mitigation actions in the 2016 Plan, and did not complete either of them; they have been carried over into the 2021 Plan, along with seven new actions.

C.8.1 National Flood Insurance Program

Recognizing the importance of the National Flood Insurance Program (NFIP) in mitigating flood losses, the City of Golden will place an emphasis on continued compliance with the NFIP. As an NFIP participant, the City has 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 as well as review of any potential development in special flood hazard areas.

C.8.2 Mitigation Actions

The local planning team identified and prioritized the following mitigation actions for the City of Golden based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

H&M: Health & Medical

ENG: Energy

S&S: Safety & Security

FWS: Food, Water, Sheltering

TRN: Transportation

HAZ: Hazardous Waste

Table C-30 City of Golden Mitigation Action Plan

Number	Title and Description	Hazard(s) Mitigated	Related Goals & Lifelines	Lead Agency and Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status / Implementation Notes
Golden 1	Heritage Road culvert improvements. This project would involve replacement of undersized, failing culvert under Heritage Rd that was built in the 1940s. The new culvert will be designed to pass the 100-year flood under the road, reducing the potential for property and road damage, and keeping access to City Fire Station open at all times. Second phase planned for Lena Gulch to channelize and contain the 1% flood. Benefits include reducing flooding of property and structures, road damage including access to City Fire Station.	Flood	2, FWS, S&S, TRN	City of Golden Public Works	\$2M appropriated to date for 2nd phase	High	2023	In Progress. Apex Gulch Culvert (initial phase) is completed. Lena Gulch (phase 2) is currently in process. Master plan completion is imminent, and design planned for '21-'22 with construction in '22-'23.
Golden 2	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The City of Golden participates in the National Flood Insurance Program. The City also participates in the Community Rating System and is a CRS Class 7 (up from 9 in 2010). This project restates the commitment of the City of Golden to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated to or above the base flood elevation. This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date. Floodplain managers will remain current on NFIP policies. The City of Golden's City Engineer and Civil Engineer are both Certified Floodplain Managers (CFMs) in good standing with the Association of State Floodplain Managers. The City also distributes the enclosed brochure each Spring to all properties in the floodplain.	Flood	2;	City of Golden Public Works	Low Covered in existing budget	Medium	Ongoing	In Progress. Other activities that could be included in this effort: Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance; Suggest changes to improve enforcement of and compliance with regulations and programs; Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps; Utilize recently completed Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits; Promote and disperse information on the benefits of flood insurance, with

Number	Title and Description	Hazard(s) Mitigated	Related Goals & Lifelines	Lead Agency and Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status / Implementation Notes
								assistance from partners such as the County, Urban Drainage and Flood Control District, and Colorado Water Conservation Board. Evaluate activities that will improve Community Rating System ratings that may further lower the cost of flood insurance for residents.
Golden 3	Floodplain Mitigation Plan. The City of Golden needs to develop a floodplain mitigation plan for identified floodplains within the city, in particular along Clear Creek that flows through the city with identified structures and people in the hazard plain. We would like this identified in the new HMP as a high priority project.	Flood;	1; 2; 3; S&S; FWS; TRN; H&M; COM;	City of Golden Public Works, Golden Police and Fire Depts	Less than \$10,000 Dept Budget	High	1 year	New in 2021
Golden 4	Kenny Run, Daylighting and channel improvements. Project entails extending the open daylighting efforts for Kenny Run upstream of 14th Street to extend initially to 16th Street. The benefits of this effort are to date undefined but should result in a significant reduction in floodplain extents from 16th Street downstream to Clear Creek, removing several buildings in the Golden East Downtown area.	Flood	2, FWS, S&S, TRN	City of Golden Public Works	Estimated \$5-7M for the second phase extension of the open channel	High	2022-2024	New in 2021.
Golden 5	Community Wildfire Protection Plan (CWPP) Update. The City of Golden needs to update the CWPP, which was last updated in 2007. The City has contracted with Anchor Point to complete the update in 2021.	Wildfire	1, 2, 3; FWS; S&S	City of Golden Public Works, and Fire Depts	\$25,000 from PW and Fire budgets	High	2021	New in 2021.
Golden 6	Implement Security Operations Center as a Service (SOCaaS) with external security partner. This gives 24x7 monitoring of our network and systems for anomalous data COM; S&S traffic, malicious file operations, and other vulnerable operations.	Cyber	1,2; COM, S&S	City of Golden IT Department and Arctic Wolf Networks	Approximately \$60,000 from operating budgets	High	2021-2022	New in 2021.
Golden 7	Critical Infrastructure Resiliency Study: Assess and upgrade numerous aspects of the City's critical infrastructure in order to improve resiliency from fire,	Wildfire, Flood	1, 2; FWS; S&S	City of Golden Public	Unknown; covered under	Medium	2027	New in 2021.

Number	Title and Description	Hazard(s) Mitigated	Related Goals & Lifelines	Lead Agency and Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status / Implementation Notes
	flooding, and other natural hazards. Includes conducting studies to aid in scoping future mitigation projects. Critical infrastructure improvements will be identified through these processes and incorporated to the City's capital improvement project implementation process			Works Department	operating budgets			
Golden 8	Water Treatment Plant Improvements: Improvements to the City's water treatment plant that entail upgrading the plant's filtration system for improved performance in the event of a catastrophic fire in the Clear Creek Watershed above the plant's intake.	Wildfire	1, 2; FWS: S&S	City of Golden Public Works Department	Approximately \$600,000 from capital budget	High	2024	New in 2021.
Golden 9	Watershed Improvements: Fire mitigation measures such as ladder fuel reduction and upland watershed restoration in the Clear Creek watershed	Wildfire, Flood	1, 2; FWS: S&S	City of Golden Public Works Department, Clear Creek Forest Health, and Others	Multi-million dollar, multi-year effort; operating budget and grants	High	Ongoing	New in 2021.



Annex D. City of Lakewood

D.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The City of Lakewood fully participated in the 2021 update process as described in Section 3. The City had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section 0. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the City on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

D.2 Community Profile

Figure D-1 shows a map of the City of Lakewood.

D.2.1 History

The City of Lakewood is a home rule municipality located in eastern Jefferson County and is the most populous city in the County.

Earliest settlement of the community that is now Lakewood occurred just prior to 1860 as a result of gold-seekers. Notable early developments still standing include the Stone House at South Garrison and Estes streets, and the Rooney Ranch at West Alameda Avenue and C-470.

In the late 1800s, there were a few subsistence farms, small dairies, and orchards. Families slowly settled into the area. Entrepreneurs began to build businesses to serve the new residents and those traveling through the area. The highest concentration of commercial and residential uses occurred along the West Colfax Avenue and Wadsworth Boulevard corridors. In 1890, Jefferson County had a population of 8,450. At that time, the City of Denver had about 100,000 residents.

The name Lakewood was commonly used long before the City was incorporated in 1969. The first known use of the name was when the Loveland and Welch families created the Lakewood Subdivision in 1899. The Jefferson County Board of Commissioners awarded the Loveland and Welch families the right to build and operate a railroad on east-west streets, through the Lakewood Subdivision, from what is now Sheridan Boulevard to the City of Golden. The Denver, Lakewood and Golden Railroad was formed. The railroad right of way was established toward the end of the 19th century. The expansion of the railroad and development of a network of irrigation ditches made it possible for farms and businesses to prosper.

Roadway improvements set the stage for continued growth in the early to mid-20th century. By 1939, businesses and neighborhoods were linked by a thousand miles of county roads. In 1941, 6,000 workers labored eight months to open the Remington Arms Company, an ammunition factory on what is now the Denver Federal Center at Kipling Street and West Alameda Avenue. As workers and their families moved into the area, demand increased for housing, schools, and services.

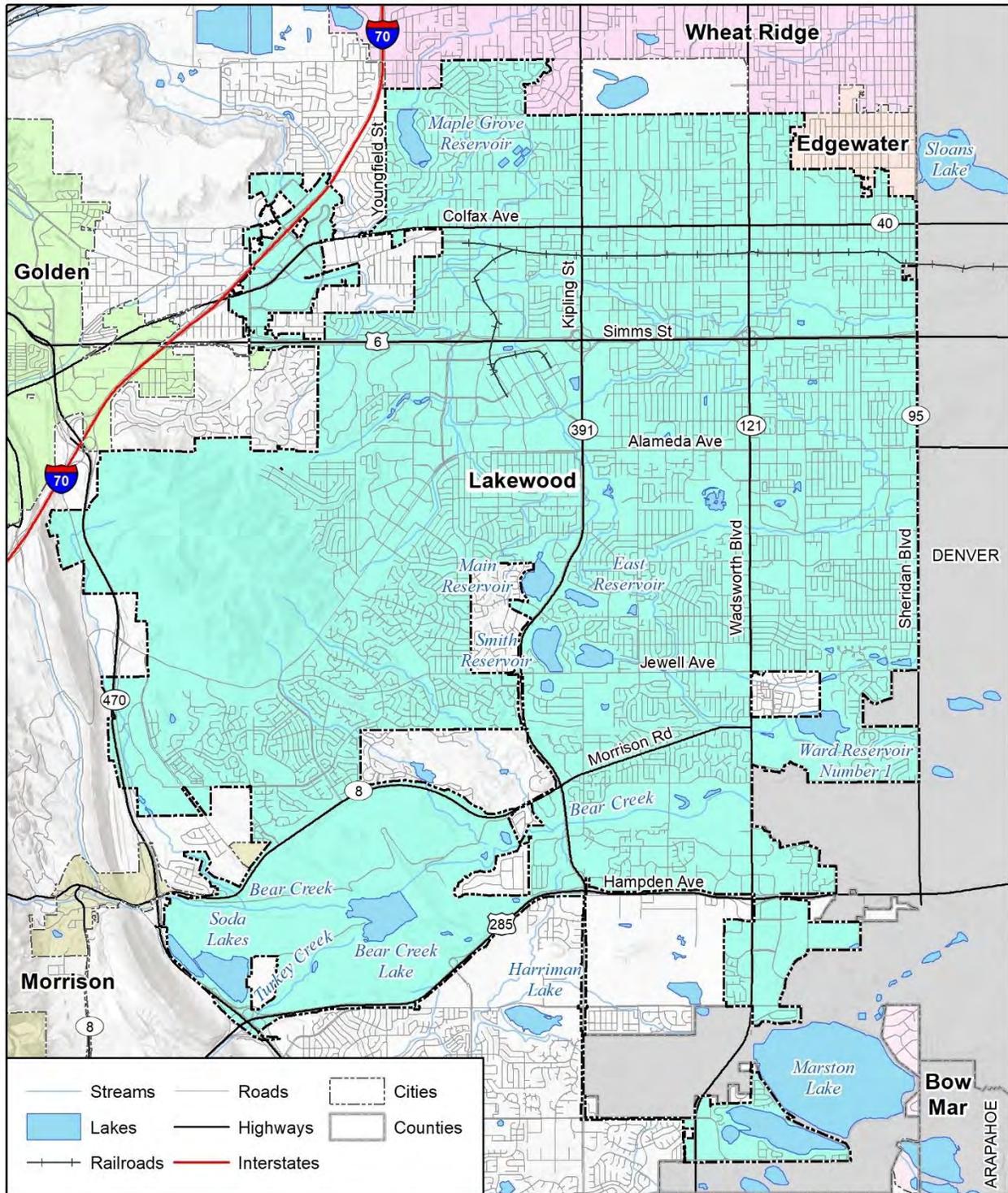
During the 1950s, people began to move to Jefferson County for its rural character. The county had more horses per person than any other county in the United States. One of the largest growth spurts in county history occurred during this time when the population increased by 130 percent from 1950 to 1960.

Several issues led to Lakewood seeking incorporation, most significantly was public safety. Busing to Denver public schools and possible annexation into Denver were additional concerns for residents in the late 1960s. There were several attempts at incorporation. These efforts were successful in 1969. At a population of 70,000, Lakewood was the largest municipal incorporation in the nation at the time.

Since 1970, Lakewood has doubled in population. Lakewood is the most populous jurisdiction in Jefferson County. Lakewood also houses the prestigious Lakewood High School, ranked number one in the state by Newsweek, and the only International Baccalaureate School in Jefferson County. Lakewood is also home to Colorado Christian University and Red Rocks Community College.



Figure D-1 City of Lakewood



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles





D.2.2 Population

The U. S. Census Bureau's estimated 2019 population of Lakewood was 155,146. The following tables and graphs summarize key demographic and social characteristics of the City of Lakewood based on the U.S. Census Bureau's American Community Survey, 5-Year Estimates, 2015-2019.

Table D-1 Lakewood's Demographic and Social Characteristics

Lakewood	2015	2019	% Change
Population	147,836	155,146	4.94%
Median Age	38.1	38.6	1.3%
Total Housing Units	65,667	68,713	4.6%
Housing Occupancy Rate	96.2%	96.5%	0.3%
% of Housing Units with no Vehicles Available	6.6%	6.3%	-4.5%
Median Home Value	\$254,700	\$364,800	43.2%
Unemployment Rate	6.4%	3.5%	-45.3%
Mean Travel Time to Work (minutes)	25.8	27.2	5.4%
Median Household Income	\$56,954	\$66,740	17.2%
Per Capita Income	\$32,107	\$38,612	20.3%
% of Individuals Below Poverty Level	13.1%	9.1%	-30.5%
% Without Health Insurance	6.5%	7.9%	21.5%
# of Households	63,159	66,274	4.9%
Average Household Size	2.3	2.3	0.9%
% of Population Over 25 with High School Diploma or Higher	91.5%	92.2%	0.8%
% of Population Over 25 with Bachelor's Degree or Higher	36.5%	40.9%	12.1%
% with Disability	11.1%	10.8%	-2.7%
% Speak English less than "Very Well"	4.3%	4.9%	14.0%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table D-2 Lakewood Demographic & Social Characteristics Compared to the County & State

Demographic & Social Characteristics (as of 2019)	Lakewood	County	Colorado
Median Age	38.6	40.3	36.7
Housing Occupancy Rate	96.5%	96.4%	90.0%
% of Housing Units with no Vehicles Available	6.3%	3.9%	5.1%
Median Home Value	\$364,800	\$397,700	\$343,300
Unemployment	3.5%	3.6%	4.3%
Mean Travel Time to Work (minutes)	27.2	28	25.8
Median Household Income	\$66,740	\$82,986	\$72,331
Per Capita Income	\$38,612	\$44,119	\$38,226
% of Individuals Below Poverty Level	9.1%	7.1%	10.3%
% Without Health Insurance	7.9%	5.5%	7.6%



Demographic & Social Characteristics (as of 2019)	Lakewood	County	Colorado
Average Household Size	2.3	2.40	2.56
% of Population Over 25 with High School Diploma or Higher	92.2%	94.5%	91.7%
% of Population Over 25 with bachelor's degree or Higher	40.9%	45.2%	40.9%
% with Disability	10.8%	10.0%	10.6%
% Speak English less than "Very Well"	4.9%	3.0%	5.8%

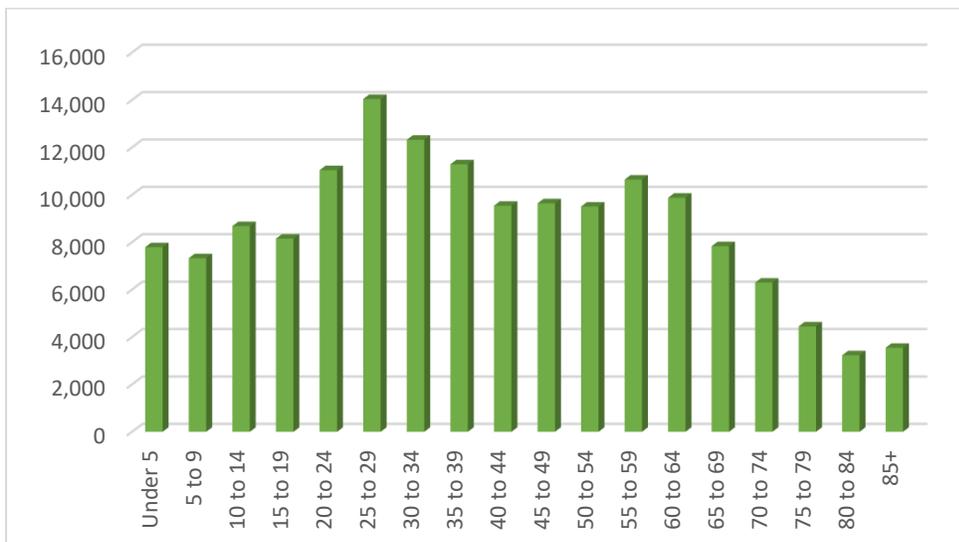
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table D-3 Lakewood Demographics by Race and Sex

Lakewood	Population	%
Total Population	155,146	
Male	76,522	49.3%
Female	78,624	50.7%
White, not Hispanic	106,998	69.0%
Hispanic or Latino	35,626	23.0%
Black	1,927	1.2%
Asian	5,523	3.6%
American Indian and Alaska Native	859	0.6%
Native Hawaiian and Other Pacific Islander	56	0.0%
Some other race	435	0.3%
Two or more races	3,722	2.4%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

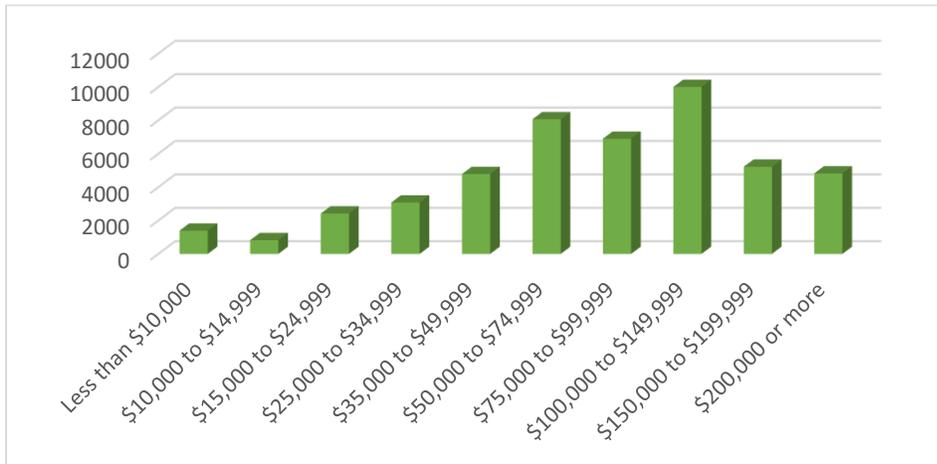
Figure D-2 Lakewood Population by Age



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019



Figure D-3 Lakewood Income Distribution



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

D.2.3 Social Vulnerability

Social vulnerability scores for the City of Lakewood can be seen in Figures 2-2 through 2-6 in Section 2 of the Base Plan. The City of Lakewood is characterized by a mix of low (bottom 20% in the county) to high (top 20% in the county) levels of social vulnerability. The highly socially vulnerable areas are clustered in the eastern part of the City. Resources and measures to reduce the social determinants of disasters may be most effectively allocated to these areas. Moreover, it is critical that the city analyze the individual social vulnerability indicators that make the northern part of the community stand out. Through ongoing evaluation, the City of Lakewood will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

D.2.4 Growth and Development Trends

Table D-4 shows the various types and amounts of housing units in the City of Lakewood based on data from the American Community Survey Five Year Estimates for 2015-2019. As shown in the table, nearly half of the housing units (49.1%) are single family homes (1-unit detached) in Lakewood.

Table D-4 City of Lakewood Types and Totals of Housing Units

Type of Housing Units	Total	%
Total housing units	68,713	
1-unit detached	33,744	49.1%
1-unit attached	7,740	11.3%
2 units	1,192	1.7%
3 or 4 units	3,211	4.7%
5 to 9 units	6,007	8.7%
10 to 19 units	6,949	10.1%
20 or more units	9,258	13.5%
Mobile home	593	0.9%
Boat, RV, van, etc.	19	0.0%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019



Table D-5 illustrates how Lakewood has grown in terms of population and number of housing units between 2010 and 2019. The table illustrates that Lakewood is undergoing moderate growth without adding much housing stock.

Table D-5 Lakewood’s Change in Population and Housing Units, 2010-2014

2010 Population	2019 Population Estimate	Estimated Percent Change 2010-2019	2010 # of Housing Units	2019 Estimated # of Housing Units	Estimated Percent Change 2010-2019
142,995	155,146	+4.94%	65,054	68,713	+6%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

The Lakewood planning team members reported that there has been growth of low-medium density residential development in the Rooney Valley area south of Green Mountain, which is identified as an area of dipping bedrock and subsidence hazards. Approximately 1,146 new residential lots have been platted west of Indiana Street since 2016, and the amendment to the Solterra Center Official Development Plan in Jan 2021 allows up to 950 additional residential units, along with office and commercial uses typical of mixed-use employment centers.

The residential growth limitation ordinance was passed by voters in 2019, which restricts the number of new residential units that can be constructed each year to 1% growth. This ordinance created exceptions for new residential development on property deemed to be “blighted,” interpreted initially to be those properties within the existing Lakewood Renewal Authority Areas. Developers may request Council to designate additional properties to be “blighted” on a case-by-case basis. The conditions for establishing blight include deteriorating structures, inadequate infrastructure, unsafe conditions, and environmental contamination. Since these areas are exempt from the residential growth limitation, there has been significant interest in new development in parts of the city which are generally older and may strain existing utility capacities by adding hundreds of new residential units.

In particular with an anticipated increase in the number of hot days due to climate change, there will be more demand on the power grid to supply electricity for air conditioning, which could result in brownouts or blackouts. In the northern and eastern parts of the city, over 25% of the existing housing stock was built before 1960 and may not have air conditioning installed. These areas of the city also correlate with lower incomes, greater Hispanic populations, and designated CDBG areas. Residents in these areas may be less likely to be able to afford to install air conditioning or the increased ongoing utility bills.

Table D-6 shows Lakewood’s estimated population changes through 2030.

Table D-6 City of Lakewood Population Projections Through 2030

2010 Population	2025 Population	2035 Population	% Projected Yearly Growth Rate
142,995	171,000	190,000	1.15%

Source: City of Lakewood Imagine Lakewood 2025, Denver Regional Council of Governments

D.2.5 Natural, Cultural, and Historic Resources

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

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



Natural Resources

The City of Lakewood owns and maintains 99 parks totaling over 7,100 acres of open space with approximately 180 miles of multi-use trails.

Natural resources of importance in Lakewood include the Main Reservoir, Smith Reservoir, East Reservoir, Hayden Green Mountain Park, Bear Creek Lake Park, Charles Whitlock Recreation Center, Lakewood Park, Green Mountain Recreation Center, Addenbrooke Park, O’Kane Park, Carmody Recreation Center and Park, Belmar Park, Crown Hill Park, Kendrick Lake Park, and the Bear Creek Greenbelt. For information about natural resources in Jefferson County, which includes Lakewood, see Section 4.2.3 of the Base Plan.

Historic and Cultural Resources

Table D-7 the properties in Lakewood that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties; for more information about these registers, see Section 4.2.3 of the Base Plan.

Table D-7 Lakewood’s Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Building 710, Defense Civil Preparedness Agency, Region 6 Operations Center	Denver Federal Center	3/20/2000
Davies’ Chuck Wagon Diner	9495 W. Colfax Ave.	7/20/1997
Hill Section, Golden Hill Cemetery	12000 W. Colfax Ave.	7/31/1995
Jewish Consumptives’ Relief Society	6401 W Colfax Ave.	6/26/1980
Office of Civil Defense Emergency Operations Center	Denver Federal Center	12/16/1999
Peterson House	797 S. Wadsworth	9/10/1981
Schnell Farm	3113 S. Wadsworth	2/14/1997
Stone House	2900 S Estes Street	5/1/1975
Denver & Intermountain Interurban No. 25	Denver Federal Center, W. Alameda Ave., and S. Kipling St.	State Register 12/10/1997
Howell House	1575 Kipling St.	State Register 9/11/1996
Washington Heights School	6375 W. First Ave.	State Register 7/13/1994
Country Club Gardens	1160 Pierce St.	State Register 8/27/2009
Bonfils-Stanton Belmar Estate Outbuildings	797 S. Wadsworth Blvd.	State Register 5/23/2013

Sources: National Register of Historic Places, <https://www.nps.gov/subjects/nationalregister/> and Colorado State Register of Historic Properties: <https://www.historycolorado.org/colorado-state-register-historic-properties>

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. There are currently 17 Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) buildings in the vicinity of the City of Lakewood, but only the Peterson House (see Table D-7) lies within the City limits.

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.

Lakewood also has locally designated landmarks including:

- 40 West Arts Colorado Certified Creative District (approximately centered around Lamar Street and Colfax Ave, including Lamar Station and Rocky Mountain College of Art & Design)
 - <https://www.lakewood.org/Government/Departments/Planning/Comprehensive-Planning-Main/40-West-Arts-Creative-District>



- Historic Preservation program, including Plan, Ordinance, locally-designated landmarks, and historic surveys.
 - <https://www.lakewood.org/Government/Departments/Planning/Comprehensive-Planning-Main/Historic-Preservation>

D.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the City of Lakewood using the same methodology as in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Table D-8 lists the significance of each hazard for the City of Lakewood based on the updated risk assessment and planning team input.



Table D-8 City of Lakewood – Hazards Summary

Hazard	Frequency of Occurrence	Geographic Extent	Potential Magnitude	Overall Significance
Avalanche	Unlikely	Limited	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Occasional	Significant	Limited	Medium
Drought	Likely	Extensive	Limited	Medium
Earthquake	Occasional	Limited	Limited	Low
Erosion and Deposition	Likely	Limited	Negligible	Low
Expansive Soils	Likely	Significant	Negligible	Low
Extreme Temperatures	Highly Likely	Extensive	Limited	Medium
Flood	Likely	Significant	Limited	Medium
Hailstorm	Likely	Extensive	Limited	Medium
Landslide, Debris flow, Rockfall	Likely	Limited	Negligible	Low
Lightning	Likely	Limited	Negligible	Low
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Highly Likely	Extensive	Limited	Medium
Subsidence	Likely	Limited	Negligible	Low
Tornado	Occasional	Limited	Limited	Medium
Wildfire	Likely	Limited	Limited	Medium
Windstorm	Highly Likely	Extensive	Negligible	Low

<p>Geographic Extent</p> <p><u>Negligible</u>: Less than 10 percent of planning area or isolated single-point occurrences</p> <p><u>Limited</u>: 10 to 25 percent of the planning area or limited single-point occurrences</p> <p><u>Significant</u>: 25 to 75 percent of planning area or frequent single-point occurrences</p> <p><u>Extensive</u>: 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity</p> <p><u>Negligible</u>: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.</p> <p><u>Limited</u>: 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.</p> <p><u>Critical</u>: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.</p> <p><u>Catastrophic</u>: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>	<p>Probability of Future Occurrences</p> <p><u>Unlikely</u>: Less than 1 percent probability of occurrence in the next year or has a recurrence interval of greater than every 100 years.</p> <p><u>Occasional</u>: Between a 1 and 10 percent probability of occurrence in the next year or has a recurrence interval of 11 to 100 years.</p> <p><u>Likely</u>: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years</p> <p><u>Highly Likely</u>: Between 90 and 100 percent probability of occurrence in the next year or has a recurrence interval of less than 1 year.</p> <p>Overall Significance</p> <p><u>Low</u>: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.</p> <p><u>Medium</u>: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating.</p> <p><u>High</u>: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>
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D.4 Community Asset Inventory

Table D-9 shows the total number of improved parcels, properties, and their improvement and content values for the City of Lakewood. See Section 4.2. of the Base Plan for details and methodology.

Table D-9 Lakewood’s Property Inventory

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Agriculture	1	1	\$46,378	\$46,378	\$92,756
Commercial	1,235	2,115	\$2,012,874,841	\$2,012,874,841	\$4,025,749,682
Exempt	159	229	\$412,727,409	\$412,727,409	\$825,454,818
Industrial	165	269	\$179,504,955	\$179,504,955	\$359,009,910
Mixed Use	301	365	\$249,172,992	\$249,172,992	\$498,345,984
Residential	47,529	51,150	\$15,722,715,358	\$7,861,357,679	\$23,584,073,037
Total	49,390	54,129	\$18,577,041,933	\$10,715,684,254	\$29,292,726,187

Source: Jefferson County Assessor’s Office

Table D-10 lists summary information about the 456 critical facilities and other community assets identified by the City as important to protect or that provide critical services in the event of a disaster. The critical facilities are organized by FEMA Lifelines. For additional information on the definitions behind each critical facility category, source, and other details refer to Section 4.2.2 of the Base Plan.

Table D-10 Summary of Lakewood’s Critical Facilities in GIS

FEMA Lifeline	Count
Communications	216
Energy	10
Food, Water, Shelter	8
Hazardous Materials	24
Health and Medical	66
Safety and Security	85
Transportation	47
Total	456

Source: Jefferson County Assessor

D.5 Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the City of Lakewood, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the City’s risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soils
- Extreme Temperatures
- Hailstorm
- Lightning
- Tornado
- Windstorm
- Winter Storm
- Cyber Attack
- Pandemic/Public Health

The following sections detail vulnerability to specific hazards, where quantifiable, and where it differs from that of the overall County. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas. For a discussion of the methodology used to develop the loss estimates refer to Section 4.3 of the Base Plan.



D.5.1 Flood

Past Events

2013 September Floods

In September 2013, Bear Creek Lake Park and the Regional Law Enforcement Shooting Range were significantly impacted by the wide-spread and disastrous flooding that hit Colorado. The flooding at Bear Creek Lake Park began on September 12 when the U.S. Army Corps of Engineers, which owns the property and leases it to the City of Lakewood, closed the gates on Bear Creek Reservoir to prevent further downstream flooding as designed. On September 13, the park was closed, and heavy rains caused Bear Creek to overflow its banks under C470 causing flood damage and debris collection and piling. By the end of the day, flood waters and debris reached to the paved bicycle trail adjacent to Morrison Road, Skunk Hollow Picnic Shelter and the surrounding Owl Trail, Mount Carbon Trail, and Cottonwood Trail. With a river flow of 1,800 cubic feet per second, the rushing waters of Bear Creek damaged surrounding park amenities such as trails and roads and changed the course of the creek. In total seven miles of the 16 total miles of trail in the park were impacted by the flood, with roughly 4,200 feet of trail needing significant repair. The Shooting Range at 690 S. Rooney Road also experienced unprecedented flooding and destructive debris flows on all three target ranges and on the facility property. On September 16, 2013, the City evaluated damage and developed plans to restore the site at a projected cost of \$90,000. Each of the three shooting ranges, the access road, adjacent ditches, steep slopes, and the main parking area exhibited extensive flood damage. The scope of work restored immediate function to the ranges and provided preventative measures to improve future drainage. Total cost of project completion and removal of contaminated soils was \$110,000.

Estimating Potential Losses

Figure D-4 depicts the FEMA flood zones (1% annual chance and 0.2% annual chance) and Figure D-5 at risk properties in Lakewood. The main sources of flooding concerns in the City are from Lakewood Gulch, Lena Gulch, and other drainageways off Green Mountain.

As shown in Table 4-38 in Section 4.3.9 of the Base Plan, the City of Lakewood has 212 improved parcels, 269 buildings with an estimated loss of \$74,482,466 within the 1% annual chance flood. Of the buildings in the 1% annual flood area, 138 are considered residential, exposing an estimated 388 residents to flooding. Lakewood is among the cities with the greatest potential losses in the County from flooding the 1% annual flood chance. There are an additional 297 parcels, 309 buildings located in the 0.2% annual chance flood hazard area, with estimated loss of \$40,745,542. There are 290 residential buildings in the 0.2% annual flood area and an estimated 686 residents potentially exposed. Based on this analysis, Table D-11 shows the parcels and buildings at risk to the 1% annual chance flood and Table D-12 shows the values at risk in the 0.2% flood scenario. Note that this analysis does not account for properties which may have been built in accordance with local floodplain regulations and mitigated to the 1% annual chance flood.

Table D-11 Lakewood Values At-Risk to 1% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss	Population
Commercial	52	85	\$27,573,709	\$27,573,709	\$55,147,418	\$13,786,855	
Exempt	4	4	\$2,942,409	\$2,942,409	\$5,884,818	\$1,471,205	
Industrial	13	25	\$7,039,789	\$10,559,684	\$17,599,473	\$4,399,868	
Mixed Use	5	6	\$2,075,898	\$2,075,898	\$4,151,796	\$1,037,949	
Residential	138	149	\$143,430,905	\$71,715,453	\$215,146,358	\$53,786,589	338
Total	212	269	\$183,062,710	\$114,867,152	\$297,929,862	\$74,482,466	338

Source: Wood analysis with Jefferson County Assessor's Data



Table D-12 Lakewood Values At-Risk to 0.2% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss	Population
Commercial	7	7	\$12,183,005	\$12,183,005	\$24,366,010	\$6,091,503	
Residential	7	7	\$12,183,005	\$12,183,005	\$24,366,010	\$6,091,503	
Total	290	302	\$92,410,771	\$46,205,386	\$138,616,157	\$34,654,039	686

Source: Wood analysis with Jefferson County Assessor's Data

Local Flood Areas (Zone D)

Not included in the tables above is analysis of locally regulated floodplains and FEMA Zone D, which are mostly in the southern portion of the County where development is limited (Refer to Figure 4-32 and Figure 4-34 of the Base Plan). Jefferson County regulates areas in Zone D that are within 50 feet of the thalweg (aka deepest part of a stream channel) of a major drainage tributary area of 130 acres or greater. With the City of Lakewood there are 3 buildings with a total value of \$1,500,616 and an estimated loss value of \$375,154 at risk to flooding in this area. Of the 3 buildings, 2 are residential potentially exposing 5 residents to flooding. The follow table shows the results of the analysis using the county's local flood layers.

Table D-13 Properties within Local Flood Areas (Zone D)

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss	Population
Commercial	1	1	\$299,234	\$299,234	\$598,468	\$149,617	
Residential	1	1	\$299,234	\$299,234	\$598,468	\$149,617	
Total	2	2	\$601,432	\$300,716	\$902,148	\$225,537	5

Source: Jefferson County Floodplain Administrator, Wood Analysis

The City also has some non-stream areas prone to flooding such as Dry Gulch and North Dry Gulch, which are not designated floodplains but create frequent surface flooding problems.

Critical Facilities There are 22 critical facilities in the 1% annual chance flood zone, 14 of which are bridges (Table D-14). The analysis also showed that there are seven additional critical facilities in the 0.2% annual chance flood zone (Table D-15) and 1 communication tower located within the Local Flood Hazard.

Table D-14 Lakewood Critical Facilities in 1% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	4
Energy	Electric Substation	2
Food, Water, Shelter	Wastewater Plant	1
Safety and Security	Fire Station	1
Transportation	Bridge	14
Total		22

Source: Jefferson County, HIFLD



Table D-15 Lakewood Critical Facilities in 0.2% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	4
Energy	Electric Substation	2
Food, Water, Shelter	Wastewater Plant	1
Safety and Security	Fire Station	1
Transportation	Bridge	14
Total		22

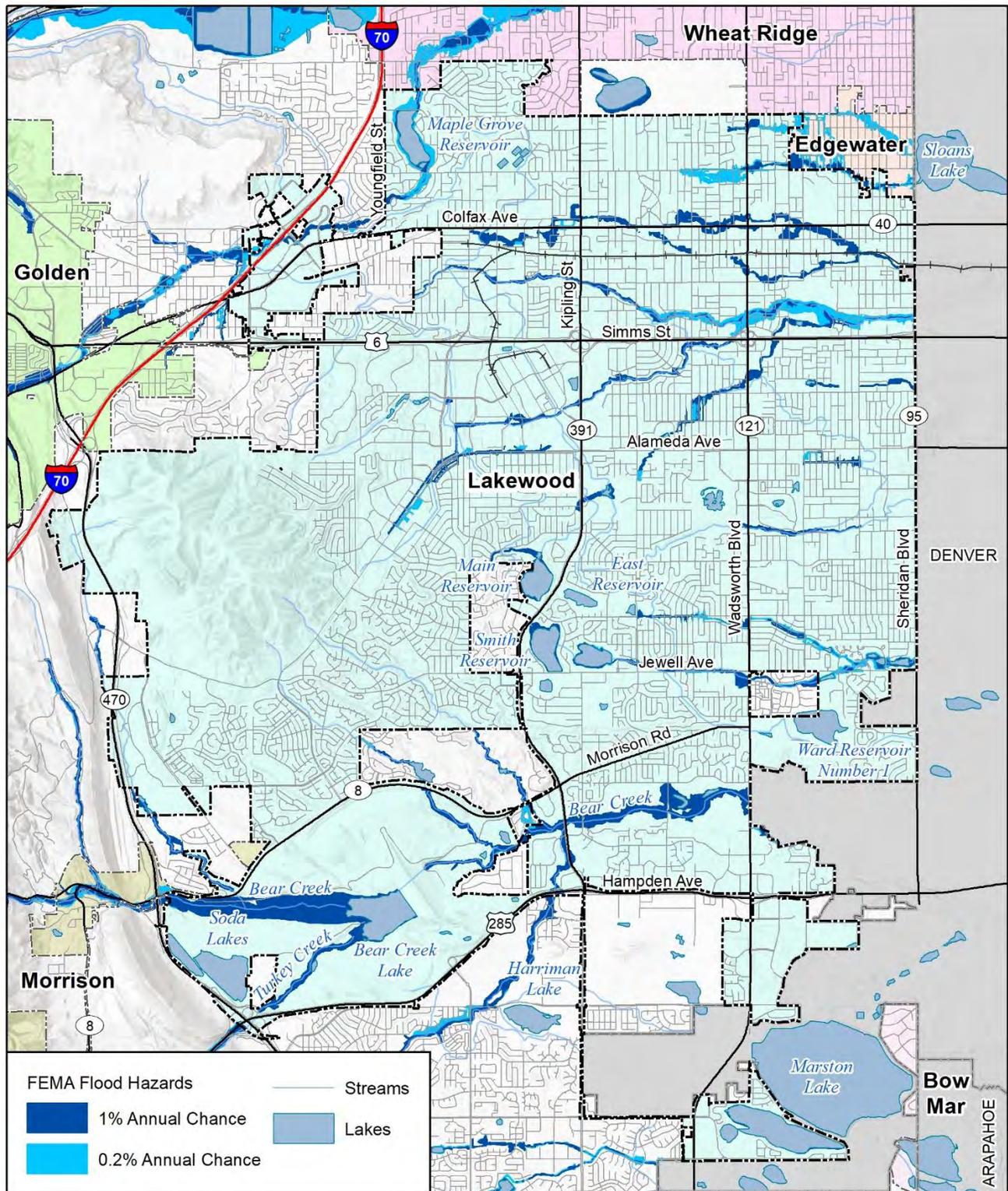
Source: Jefferson County, HIFLD

National Flood Insurance Program

The City of Lakewood has participated in the National Flood Insurance Program (NFIP) since 1972. NFIP insurance data shows that as of January 2021 there are 371 flood insurance policies in force in the City providing \$107,586,600 of coverage. There have been 157 historical claims for flood losses (the greatest number of claims in the County) totaling \$649,522. According to data from the Colorado Water Conservation Board (CWCB), there are eleven repetitive loss structures and no severe repetitive loss structures as defined by the NFIP. Of the eleven structures, eight are single family residential, one is classified as other residential, and two are “other non-residential.” There have been 31 losses among those eleven repetitive loss structures. In addition to participating in the NFIP, Lakewood is also a Community Rating System (CRS) participant and currently a Class 6 CRS community.



Figure D-4 City of Lakewood Flood Areas



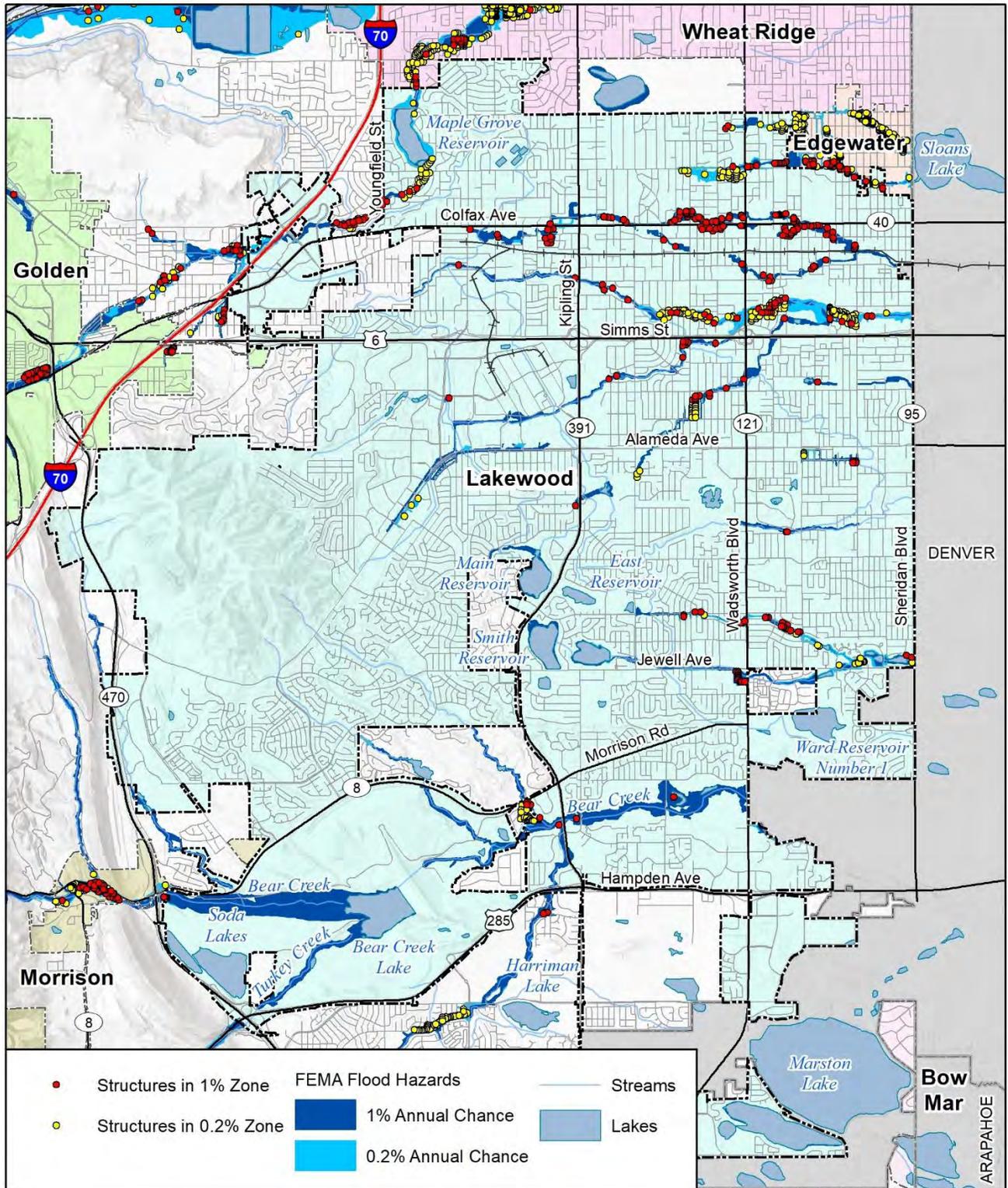
Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

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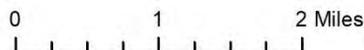




Figure D-5 City of Lakewood Flood Hazards and At-Risk Properties



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021





D.5.2 Dam Failure

Past Events

1979 Dam Failure

On March 17, 1979, the fabridam (an air- or water-filled tube from neoprene, laminated rubber, and nylon, anchored to a concrete plinth and used as an inflatable dam) of the Maple Grove Dam was punctured by an unknown, sharp object. It was determined to be most likely due to vandalism. Vandals using knives sliced open the 30-foot long dam allowing a relatively small but certainly unexpected flood to occur. The peak flow immediately below the reservoir was about 750 cubic feet per second (cfs) and caused some residential basement flooding and first floor damage to some commercial buildings. Buildings in the area of 27th and Youngfield suffered the most damage. The fabridam spillway was replaced in 2004 with a more vandal resistant structure.

Dams of Concern

Table 4-11 in Section 4.3.3 of the Base Plan lists dams of concern for Jefferson County. Dams upstream of the City of Lakewood are shown in Table D-16.

Lakewood has 7 high hazard, and 5 significant hazard dams upstream whose failure could impact life and/or property. Note: Hazard class does not indicate dam condition, it merely indicates risks in case of failure. A high hazard dam poses risk to both life and property, a significant hazard dam only poses a risk to property. See discussion the Section 4 of the Base Plan. Dam Names with an asterisk (*) next to them have been given a conditionally satisfactory or unsatisfactory rating by the State Engineer, meaning they have storage restrictions due to structural concerns. As of February 2021, 33 dams in Jefferson County were given the conditionally satisfactory or unsatisfactory ratings. While 23 of these are low hazard dams, 2 are rated significant hazard and 8 are rated high hazard. Of these dams 3 pose a concern to the City of Lakewood.

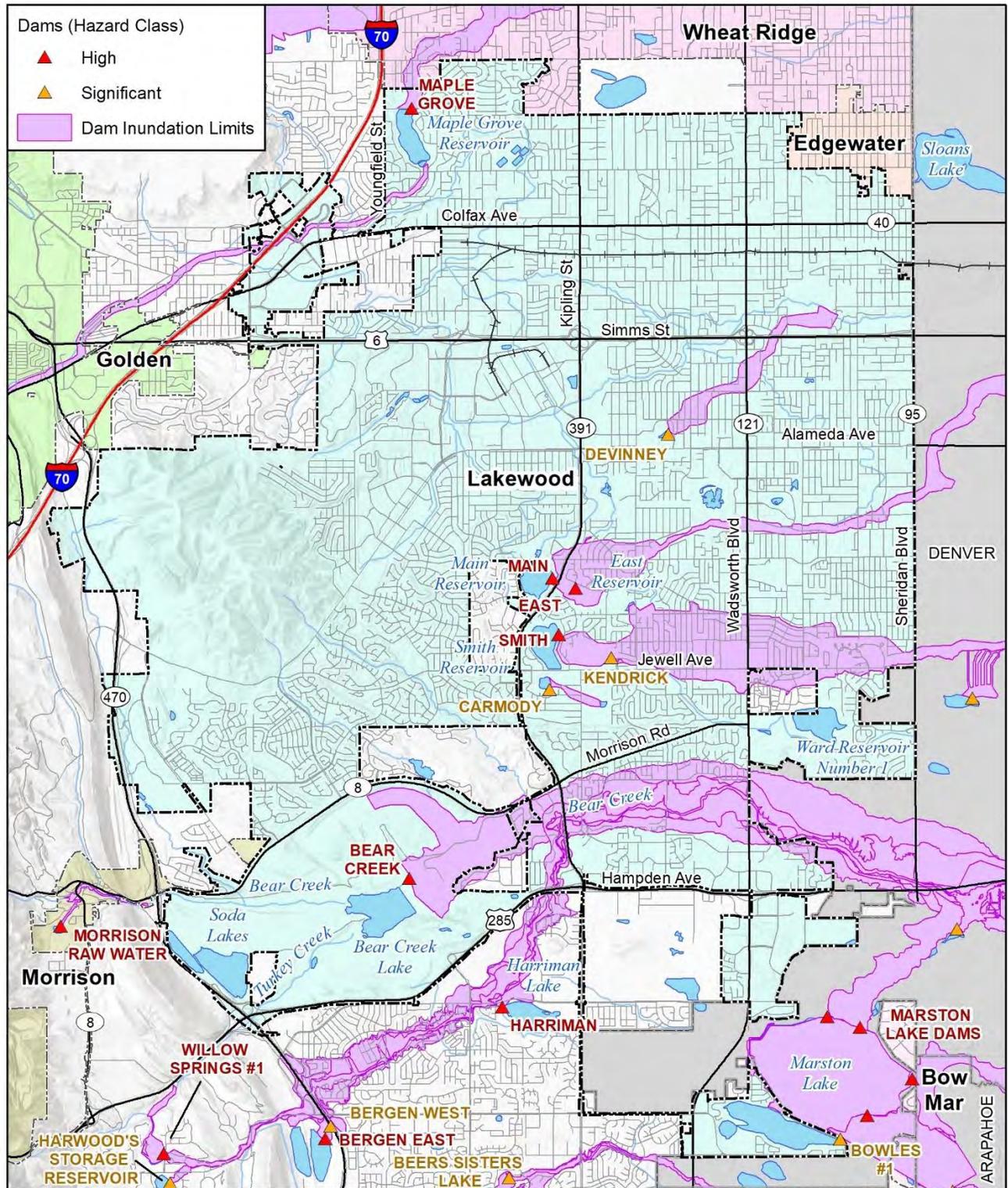
Table D-16 Dams of Concern to City of Lakewood

Dam Name	Stream	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Bear Creek	Bear Creek	2,000	Yes	High
East	Weir Gulch	102	Yes	High
Harriman	Weaver Creek	762	Yes	High
Main	Weir Gulch	583	Yes	High
Maple Grove	Lena Gulch	1,123	Yes	High
Smith*	Bear Creek	638	Yes	High
Willow Springs #1*	Turkey Creek	108	Yes	High
Bergen West*	Weaver Gulch	370	Yes	Significant
Carmody	Sanderson Gulch	22	Yes	Significant
Devinney	S. Lakewood Gulch	10	Yes	Significant
Harwood S Storage Reservoir	Weaver Gulch	143	Yes	Significant
Kendrick	Sanderson Gulch	242	Yes	Significant

Source: National Inventory of Dams, NHD



Figure D-6 Dam Inundation Areas in City of Lakewood



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety





Non-Failure Dam Incidents

The Colorado DNR has a statewide database that identifies the potential for non-failure dam inundation to show potential areas of flooding where outlet capacity exceeds the downstream channel capacity. The dams at the highest risk of non-failure inundation are shown in Table 4-13. The ranking shown in the table represents the likelihood of hazardous conditions existing below the dams during a worst case, maximum outlet release scenario. Dams are ranked as high, moderate, or low likelihood for outlet releases to cause conditions that could require an emergency response to reduce potential downstream consequences. The ranking is based on a statewide database of high hazard dams that includes 441 high hazard dams that have been analyzed by the Colorado DNR for this aspect of dam incident flooding. The high, moderate, or low designations were assigned by DNR by dividing the total number of ranked dams across the state into thirds. Should there be a need to relieve pressure on the dam (e.g., if there was excess inflow from high rains or snowmelt) releases from the dams ranked as high or moderate may result in downstream flooding. The following dams are within or upstream of Lakewood and have a risk of non-failure inundation.

Table D-17 Dam with Risk of Non-Failure Inundation

Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
090112	Bear Creek	7 FT X 10.5 FT	2,000	3	High
070219	Maple Grove	30" STEEL	102	2	High
075311	Smith	12" CIP; installed in 1940	12	228	Moderate
075309	East	18" RCP	22	280	Low
090115	Harriman	37" Steel	63	323	Low
075310	Main	20" CIP	32	284	Low
090204	Willow Springs #1	6" steel	2	358	Low

State of Colorado Department of Natural Resources, Dam Safety Division

Estimating Potential Losses

Table D-18 shows that Lakewood has the second highest number of parcels exposed to dam inundation hazards in the County. There are over 5,000 parcels or 10% of total parcels in the city that are potentially exposed with a total value of \$2.4 Billion. Of the parcels exposed, 5,120 are residential properties potentially exposing 11,461 residents to dam inundation hazards.

Table D-18 Dam Inundation Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Agriculture	1	1	\$46,378	\$46,378	\$92,756	
Commercial	56	149	\$32,534,002	\$32,534,002	\$65,068,004	
Exempt	8	13	\$32,249,867	\$32,249,867	\$64,499,734	
Industrial	1	3	\$1,087,099	\$1,630,649	\$2,717,748	
Mixed Use	5	6	\$5,992,092	\$5,992,092	\$11,984,184	
Residential	5,049	5,301	\$1,523,242,784	\$761,621,392	\$2,284,864,176	11,461
Total	5,120	5,473	\$1,595,152,222	\$834,074,380	\$2,429,226,602	11,461

Source: Jefferson County Assessor, National Inventory of Dams, NHD



Critical Facilities

There are 35 critical facilities identified in areas at risk of dam inundation in the City of Lakewood, shown in Table D-19. Bridges and nursing homes are listed most often as exposed to dam inundation hazards.

Table D-19 Critical Facilities Potentially at Risk of Dam Inundation by FEMA Lifeline

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	5
	Microwave Service Towers	2
Energy	Electric Substation	2
Hazardous Material	Tier II	1
Health and Medical	Nursing Home	8
Safety and Security	Government Facility	1
	School	1
Transportation	Bridge	15
Total		35

Source: Jefferson County Assessor, National Inventory of Dams, NHD

D.5.3 Geologic Hazards

Estimating Potential Losses

Lakewood has exposure to geologic hazards including dipping bedrock, landslides, slope failures and subsidence, see Figure D-7 and Figure D-8. Lakewood parcel data was intersected with geologic hazard data for this analysis. Most geologic hazards are concentrated in the western part of the jurisdiction just east of C-470. Rapid growth in the Rooney Valley area poses a potential concern from a geologic hazard standpoint.

Table D-20 summarizes the parcels and values at risk to slope failure. Table D-21 summarizes the parcels and values at risk to subsidence and Table D-22 summarizes parcels and values at risk to dipping bedrock. Content values are estimated and provided as reference but are not generally at-risk for subsidence or dipping bedrock.

Table D-20 City of Lakewood Slope Failure Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Exempt	1	1	\$47,800	\$47,800	\$95,600	
Industrial	1	1	\$70,740	\$106,110	\$176,850	
Residential	16	16	\$5,423,430	\$2,711,715	\$8,135,145	36
Total	18	18	\$5,541,970	\$2,865,625	\$8,407,595	36

Source: Based on analysis of Jefferson County GIS and Assessor's Data

Table D-21 City of Lakewood Subsidence Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Exempt	1	1	\$19,600	\$19,600	\$39,200	
Residential	38	38	\$20,346,836	\$10,173,418	\$30,520,254	86
Total	39	39	\$20,366,436	\$10,193,018	\$30,559,454	86

Source: Based on analysis of Jefferson County GIS and Assessor's Data



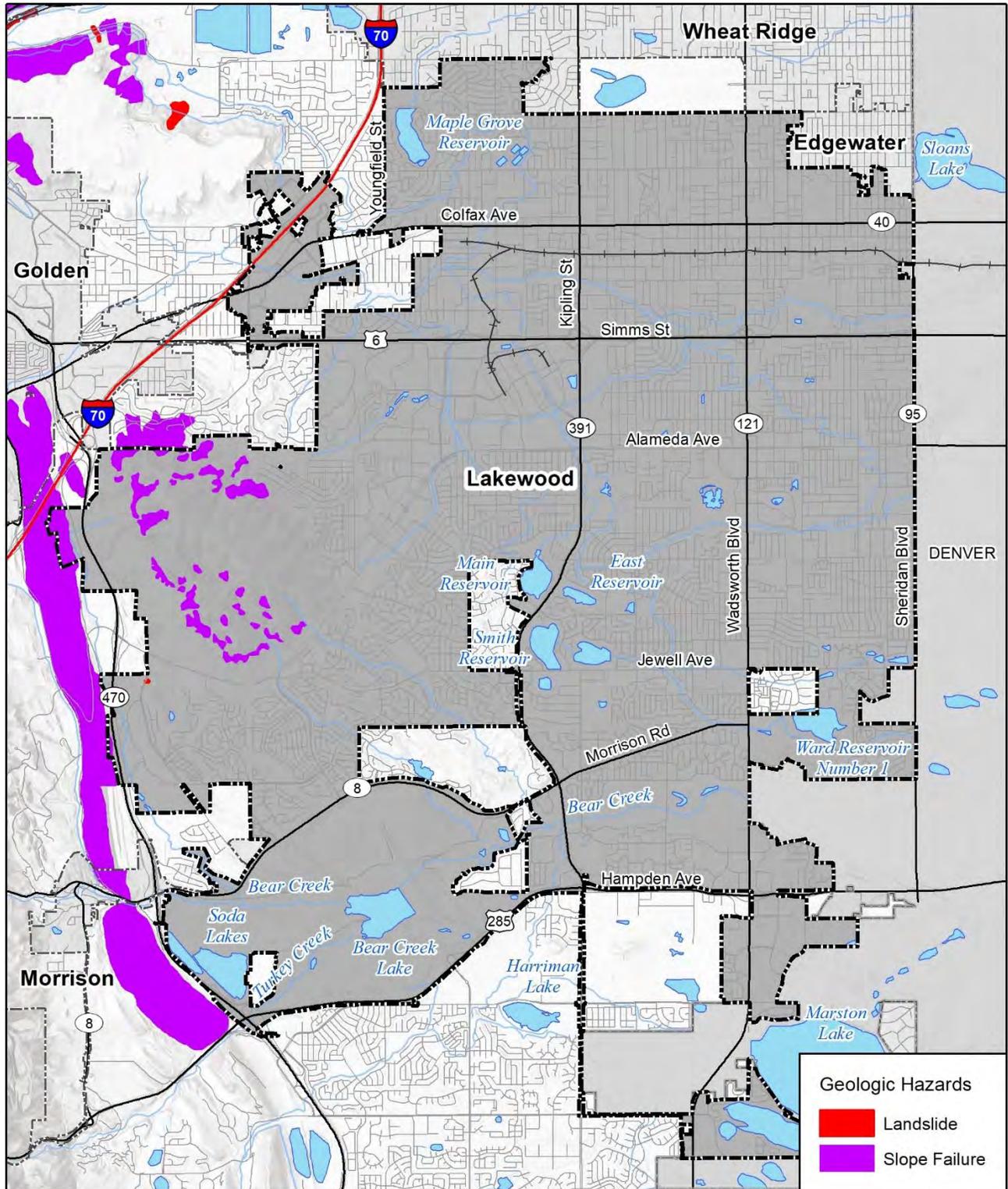
Table D-22 City of Lakewood Dipping Bedrock Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	2	15	\$4,342,406	\$4,342,406	\$8,684,812	
Exempt	2	3	\$53,193	\$53,193	\$106,386	
Industrial	1	4	\$70,740	\$106,110	\$176,850	
Residential	1,391	1,391	\$650,380,257	\$325,190,129	\$975,570,386	3,158
Total	1,396	1,413	\$654,846,596	\$329,691,838	\$984,538,434	3,158

Source: Based on analysis of Jefferson County GIS and Assessor's Data



Figure D-7 City of Lakewood Landslide Hazards



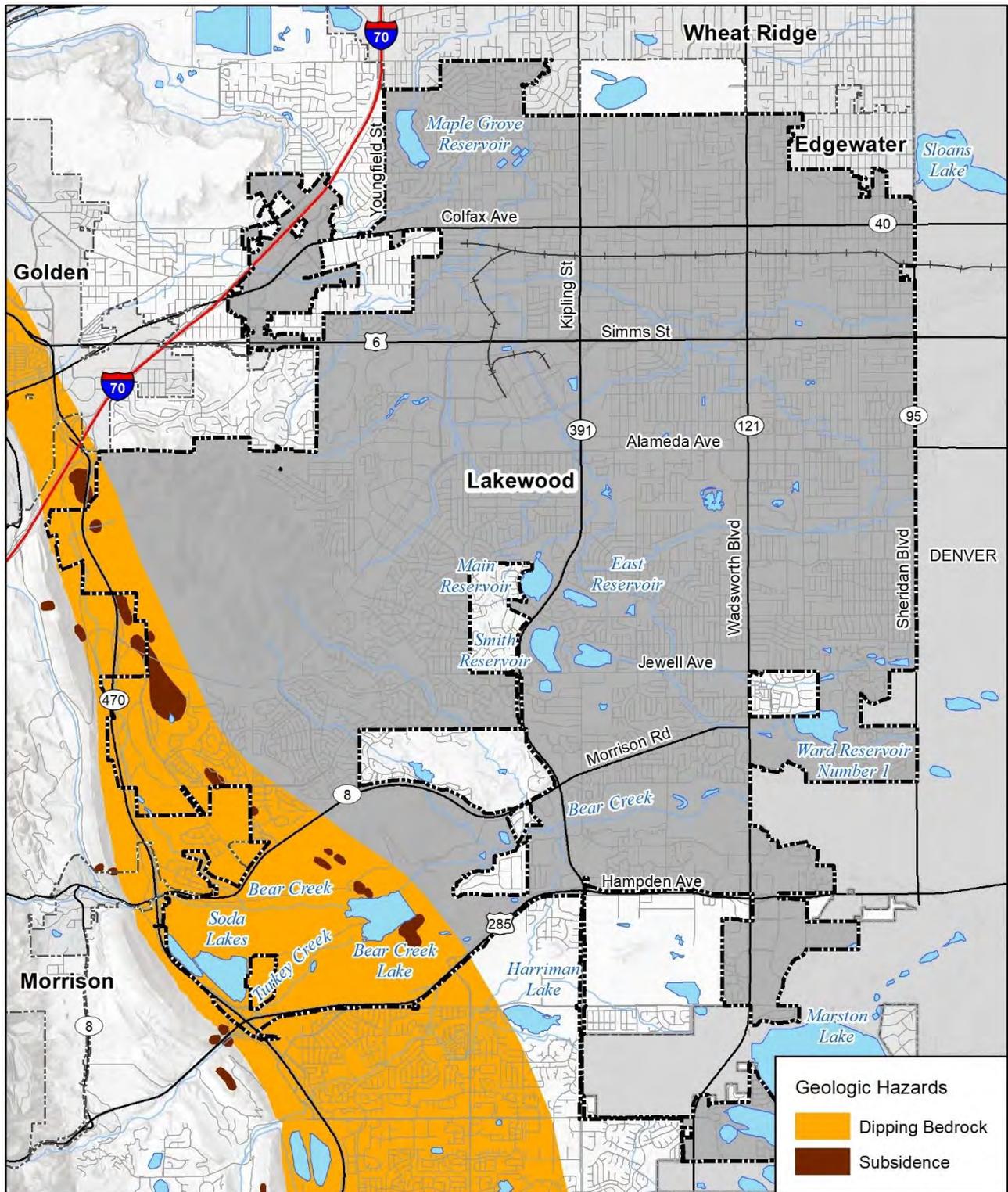
Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

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Figure D-8 City of Lakewood Dipping Bedrock and Subsidence Hazards



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles





Critical Facilities

There are 11 critical facilities identified in areas at risk of dipping bedrock in the City of Lakewood, shown in Table D-23. No critical facilities in the City were identified as being exposed to landslide or subsidence hazards.

Table D-23 Critical Facilities Potentially at Risk of Dipping Bedrock by FEMA Lifeline

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
Energy	Electric Substation	2
Food, Water, Shelter	Wastewater Plant	1
Transportation	Bridge	7
Total		11

Source: Jefferson County Assessor, National Inventory of Dams, NHD

D.5.4 Wildfire

Past Events

2008 Green Mountain Fire

On August 4, 2008 at approximately 2:30 pm the City of Lakewood experienced a large grass land fire on Green Mountain. Fire crews from West Metro Fire District along with other fire departments in Jefferson County provided fire suppression resources to fight the fire. The fire consumed 388 acres and was declared controlled on August 8, 2008.

2016 Green Mountain Fire

On November 29, 2016 another fire broke out on Green Mountain, burning approximately 300 acres. About a dozen homes were evacuated, and another 3,000 were put on standby.

2021 Morrison Road Fire

On February 7, 2021, a large grass fire driven by high winds and unusually dry conditions burned 446 acres near Bear Creek Lake Park and Fox Hollow Golf Course both located in the City of Lakewood. No buildings were damaged but evacuation orders were given to residents east of the fire from Owens Lane to Kipling. The fire was suspected to be human caused.

Estimating Potential Losses

While not a foothills community, Lakewood does have risk to wildfires, particularly grass fires on the western edge of the City around Green Mountain and Bear Creek Reservoir, see Figure D-9.

Parcel analysis was conducted using GIS to analyze where parcels, buildings counts, property types and content values intersected with the wildfire hazards zones defined by the Colorado Forest Atlas, from highest to lowest risk. In addition to parcel data, an address point layer was also used to estimate building locations. Results are shown in Table D-24 - Table D-27. Based on this analysis Lakewood is among the cities with the greatest concentration of assets at risk of wildfire. Residential property types have the greatest number of parcels at risk of wildfire, in addition there are 4,654 residents exposed to wildfire risk, a majority of which (1,988) are located in the low and moderate-risk areas.

Table D-24 High Wildfire Risk by Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Exempt	1	1	\$19,600	\$19,600	\$39,200	
Residential	30	31	\$9,551,285	\$4,775,643	\$14,326,928	70
Total	31	32	\$9,570,885	\$4,795,243	\$14,366,128	70

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data



Table D-25 Moderate Wildfire Risk by Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Exempt	2	2	\$136,000	\$136,000	\$272,000	
Residential	509	514	\$313,778,377	\$156,889,189	\$470,667,566	1167
Total	511	516	\$313,914,377	\$157,025,189	\$470,939,566	1,167

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

Table D-26 Low Wildfire Risk by Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	1	4	\$2,853,288	\$2,853,288	\$5,706,576	
Exempt	2	2	\$67,400	\$67,400	\$134,800	
Residential	276	277	\$187,336,477	\$93,668,239	\$281,004,716	629
Total	279	283	\$190,257,165	\$96,588,927	\$286,846,092	629

Source: Colorado Forest Atlas & Jefferson County Assessor's Office data

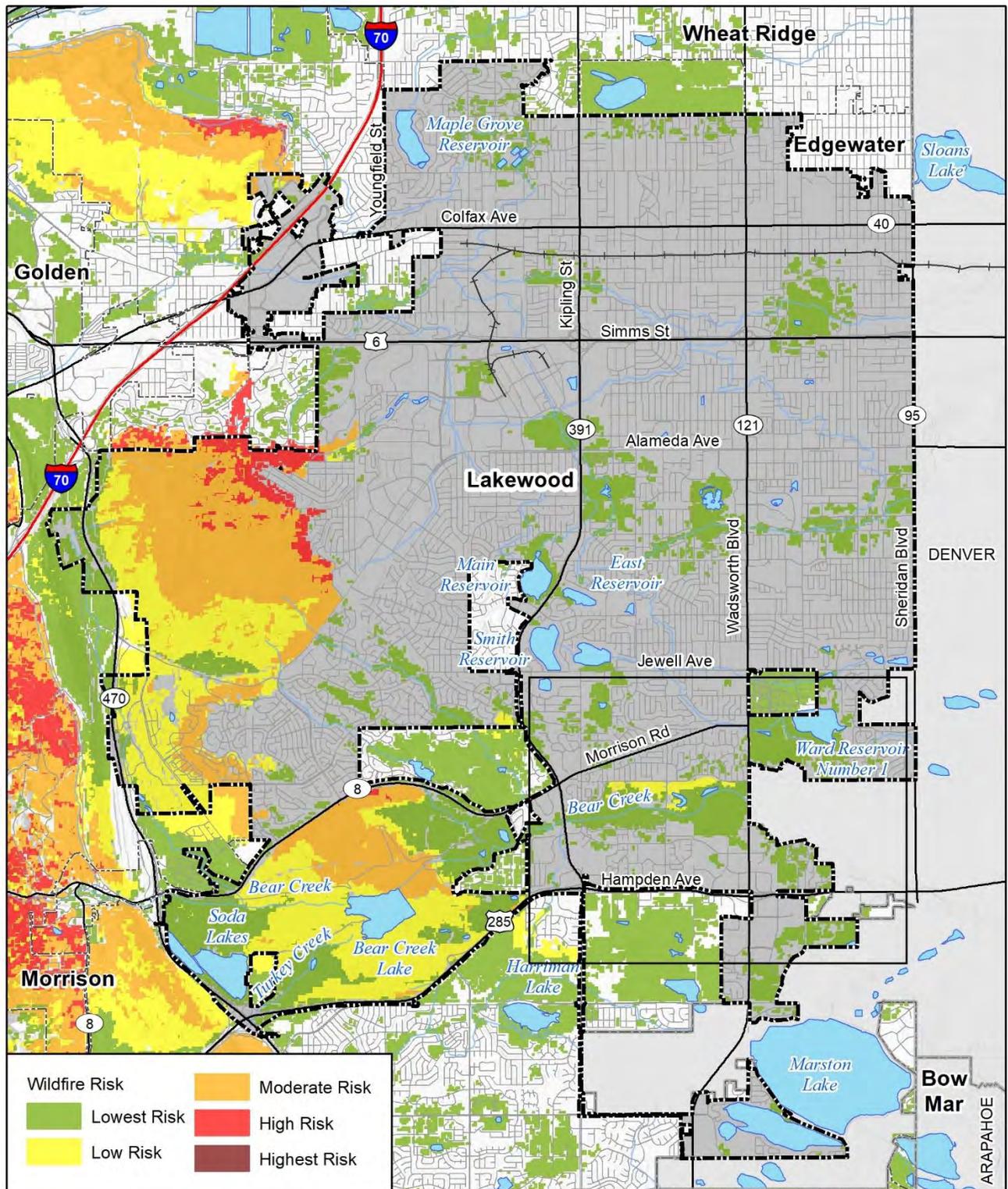
Table D-27 Lowest Wildfire Risk by Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Agriculture	1	1	\$46,378	\$46,378	\$92,756	
Commercial	15	28	\$25,150,057	\$25,150,057	\$50,300,114	
Exempt	9	10	\$20,572,037	\$20,572,037	\$41,144,074	
Industrial	2	3	\$98,006	\$147,009	\$245,015	
Mixed Use	2	2	\$628,620	\$628,620	\$1,257,240	
Residential	1,173	1,228	\$770,082,460	\$385,041,230	\$1,155,123,690	2,788
Total	1,202	1,272	\$816,577,558	\$431,585,331	\$1,248,162,889	2,788

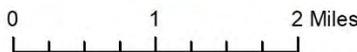
Source: Colorado Forest Atlas & Jefferson County Assessor's Office data



Figure D-9 City of Lakewood Wildfire Risk



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado State Forest Service COWRAP





Critical Facilities

The City of Lakewood has a total of 36 critical facilities at risk to wildfire, most of which are within the lowest to moderate wildfire risk areas. The following table shows the results of the GIS analysis and is organized by wildfire risk and FEMA Lifeline. Refer to section 4.3.16 of the Base Plan for more information on the methodology of the GIS analysis.

Table D-28 Lakewood Critical Facilities At-Risk to Wildfire by Type

Wildfire Risk	FEMA Lifeline	Critical Facility Type	Count
Moderate	Communications	FM Transmission	1
		Land Mobile Private Towers	8
		Microwave Service Towers	4
	Transportation	Bridge	1
Low	Transportation	Bridge	1
Lowest	Communications	AM Transmission	2
		Land Mobile Private Towers	5
		Microwave Service Towers	3
	Hazardous Material	Tier II	1
	Health and Medical	Nursing Home	3
	Safety and Security	School	3
	Transportation	Bridge	4
Total			36

Source: Jefferson County GIS, HIFLD

D.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado, and windstorm the entire building inventory and population in the City is potentially exposed. That is the reason for the asset inventory provided in Section 1.3 below. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

Through the Plan Update Guide, the City of Lakewood noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Jefferson County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction.

The following are past events noted by the HMPC in the Data Collection Guide for City of Lakewood.

December 2008 Snowstorm

A Pacific storm system coupled with upslope winds produced heavy snow in and near the foothills of Boulder, Jefferson, and Douglas Counties, and along the Palmer Divide. In the Front Range Foothills, storm totals included 12" in Lakewood. Heavy drifting was reported. Many roofs in Lakewood suffered damage. Businesses were forced to close, resulting in a loss of retail revenue for businesses and tax revenue for the city. Lakewood was granted state/federal reimbursement for snow removal costs in the amount of \$100,289.

May 2017 Hailstorm

May 8, 2017 a severe hailstorm impacted Lakewood and much of the Denver Metro Area. Local trailer parks in Lakewood were severely damaged. Over 17,000 re-roof permits were issued in 2017, compared to a normal year of about 1,000. The City of Lakewood suffered approximately \$700,000 in vehicle damages and losses, a total of 13 City vehicles were damaged. The HMPC estimates the event resulted in a total of \$3.6 million in building damages. The Colorado Mills Mall suffered from damages from the hailstorm resulting in being closed for nearly a year. Several local car dealerships also experienced severe damage from the event. In addition to the hail localized flooding was also reported.



D.6 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. Lakewood's regulatory, administrative, and technical, and fiscal mitigation capabilities are summarized in Section 2.7 of the Base Plan. Additional details on specific capabilities are discussed below.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

City of Lakewood Comprehensive Plan – Lakewood 2025

The City's Comprehensive Plan is a guide to help the City make decisions and establish its future direction. The goals and policies contained within the plan cover a broad range of subjects matter related to services, issues, and geographic areas within Lakewood. Combined, these elements serve to direct future policy decisions to preserve vital community attributes and service levels and manage growth.

The following goals and related polices that are relevant to this hazard mitigation plan are excerpted here:

- Goal L-HP-3: Implement the Historic Preservation Plan
 - Action Steps
 - Review the Historic Preservation Plan on an annual basis to ensure implementation of the goals, policies and action steps contained in the Plan.
- Goal L-PR3: Implement the Community Resources Master Plan
 - Action Steps:
 - Review the Community Resources Master Plan and other planning documents on an annual basis to ensure implementation of the goals and objectives contained in the plans.
- Goal L-PS3: Leverage regionalization opportunities with other law enforcement agencies to improve police service and reduce costs.
 - Action Steps:
 - Explore consolidating the five police communication centers into a regional communication center.
- Goal L-PS4: Partner with the West Metro Fire Protection District to ensure adequate fire protection, emergency medical services, life safety, and community services are provided.
 - Action Steps:
 - Work with West Metro Fire Protection District during the site plan review process to ensure site development adequately addresses fire and rescue access.
 - Adopt, in partnership with the West Metro Fire Protection District, appropriate changes to fire codes to take advantage of evolving building technologies and to stay current with developing fire protection science.
- Goal L-PS5: Ensure, to the greatest extent possible, the City is adequately prepared to respond to emergencies and recovery activities before, during, and after major emergencies and disaster events.
 - Action Steps:
 - Evaluate the Emergency Operations Plan every four years and update as necessary to provide, manage, and coordinate high-level emergency response and recovery activities.



- Goal S-AQ2: Engage the public regarding climate change and its impact.
 - Action Steps:
 - Develop programs to assist residents, neighborhoods, and businesses in identifying sources of greenhouse gas (GHG) emissions and strategies to reduce emissions.
 - Assess the community's vulnerability to climate change impacts and develop plans and adaptation strategies to reduce community vulnerability, increase resiliency, and minimize adverse effects of climate change on the environment, economy, and public health.
- Goal S-AQ3: Improve air quality and reduce greenhouse gas (GHG) emissions by working towards compliance with state and local air quality standards.
 - Action Steps:
 - Establish a target for planting new trees and vegetation to remove CO₂, reduce urban heat island effect, and enhance urban aesthetics.
 - Evaluate street sweeping and snow plowing services for opportunities to improve air and water quality and mitigate environmental impacts of such processes.
- Goal S-W1: Protect and manage bodies of water, watersheds, and floodplains
 - Action Steps:
 - Manage floodplains and minimize disturbance of stable, natural floodplains to the greatest extent possible in order to reduce flood risk.
 - Develop policies and incentives to reestablish natural flow patterns and incorporate these areas as an amenity to the site in new development and redevelopment projects.
 - Identify potential incentives to encourage developers to dedicate or donate floodplain and floodway areas as drainage easements.
 - Determine a fee program or a funding mechanism for the purchase of parcels in the flood hazard area.
 - Develop policies and incentives for the preservation and restoration of riparian and wetland buffers on public and private property to protect and restore hydrologic function.
 - Implement the Bear Creek Watershed Association Plan.
- Goal S-W2: Increase responsible and efficient use of water resources
 - -Action Steps:
 - Develop and distribute educational information to provide outreach and resources to the Lakewood community that provides water conservation education, water-wise landscaping techniques, and identifies incentives for retrofitting homes for water efficiency.
- Goal S-W3: Enhance stormwater management and water quality.
 - Action Steps:
 - Continue to work cooperatively with Front Range communities to utilize a regional stormwater quality approach.
 - Identify and evaluate natural infiltration methods and develop ways to incorporate these methods into the site plan review process.
 - Develop and distribute educational materials for property owners about stormwater runoff mitigation techniques and pollution prevention.
- Goal S-BN1: Preserve and restore local ecosystems and ecosystem services and protect biodiversity.
 - Action Steps:
 - Develop strategies to prevent and mitigate environmental contamination of soils, water, and air from hazardous chemicals.



- Goal S-BN2: Provide and protect green infrastructure, including parks, greenways, wetlands, riparian corridors, and the urban tree canopy
 - Action Steps:
 - Identify opportunities to protect and restore riparian vegetation and wetlands through the site planning review process or through land acquisition, conservation easements, and other means.

Municipal Code

Title 14, Chapter 14.25: Floodplain Management (Ord. O-2013-1 § 2, 2013)

This section of the municipal code is intended to minimize property losses and public safety hazards due to flooding in the Lakewood flood zones.

Section 14.25.050 – Acceptance:

This section formally accepts the most recent FEMA flood insurance study (2014) and all the amendments to the Flood Insurance Rate Map (FIRM).

Section 14.25.100 – Floodplain Boundaries:

This section provides a methodology to determine the exact boundaries of the floodplain and floodway. The boundaries of the floodplain and the floodway shall be determined from information presented in the Official Flood Studies. In the absence of other information, boundaries shall be determined by scaling distances on the map. Where interpretation is needed as to the exact location of the boundaries, the Floodplain Administrator shall make the necessary interpretation. In all cases, the base flood elevation of the 100-year flood shall be the governing factor in locating the floodplain boundary on any property.

14.25.130 - Floodplain Regulations:

a. All new construction and substantial improvements of nonresidential and residential structures shall have the lowest floor, including basement, and electrical, heating, ventilation, plumbing, air conditioning equipment and other service facilities including ductwork, elevated above the highest adjacent grade at least one foot (1') above the depth number specified in feet on the FIRM, or at least three feet (3') if no depth number is specified, or one foot (1') above the crown of the nearest street, whichever is higher.

14.25.160 - Critical Facilities:

A. Classification. Critical Facilities are classified under the following categories: (1) Facilities Providing Essential Services; (2) Hazardous Materials Facilities (3) Facilities Serving At-risk Populations; and (4) Facilities Vital to Restoring Normal Services.

Other Regulations

Title 13 Water and Sewers – This section of municipal code spells out the authority of the City of Lakewood to regulate water quality, and to operate and maintain sewer and water systems. It also includes a subsection relating to stormwater runoff and quality in Lakewood. Regulations regarding avoidance of erosion during land development are also included in this subsection, as are regulations regarding well drilling for personal use.

Title 17 Zoning - Pursuant to statutory authority, this Ordinance is enacted for the following purposes:

- To promote the public health, safety, and welfare of the citizens of the City of Lakewood.
- To implement the vision, goals and recommendations of the City of Lakewood Comprehensive Plan.
- To protect and enhance the natural environment including the conservation of natural features, land and energy.
- To provide for a range of housing types and costs to meet the current and future needs of the City.
- To promote the orderly development and redevelopment of land within the City of Lakewood.
- To ensure the effective integration of development and redevelopment with surrounding land uses.
- To respect the unique characteristics and attributes of individual neighborhoods.



- To promote multi-modal transportation options within the City including safe, efficient and attractive pedestrian and bicycle connections.
- To enhance the appearance of the City of Lakewood through quality site and building design.
- To ensure the economic vitality of the City of Lakewood.

Other Plans

Damage Assessment - Provides a framework for a coordinated effort to assess physical damage to infrastructure, public property, and private property within the City of Lakewood following a disaster.

Debris Management - Outlines the process for managing response and recovery following a debris-causing event within the boundaries of the City of Lakewood. It also covers additional tasks required to maintain the City of Lakewood's readiness for disaster debris management, including training, exercises, and maintenance of the plan. This plan is scalable and may be utilized on events of varying intensity and impact.

Resource Management - Contains the processes and procedures by which the City of Lakewood will identify, order, mobilize, and deploy resources in an emergency. It provides guidance to assist in coordinating the provision of personnel, equipment, supplies, facilities and services to support the field response.

Sheltering Annex – A component to the Emergency Operations Plan (EOP) which describes the roles and responsibilities of City and partner agencies during a major emergency or disaster incident. It covers the provision of mass care, establishes potential shelter locations, and lists the tasks necessary to support shelter site operations and ensure that services and information are accessible to all members of the community.

Winter Storm Annex – Details how the City will respond to severe winter storm conditions with roles and responsibilities, notifications, City closing procedures, emergency routes, and communications resources.

Flood Annex – Identifies known flooding areas, roles and responsibilities of responding agencies in the community, notification processes, and relevant maps.

Alert and Warning Annex - Ensures timely, accurate and efficient communications regarding no-notice emergencies and anticipated events both internally to employees of Lakewood, and externally to its citizens and visitors. This plan sets forth emergency operations guidelines and identifies roles and responsibilities for all-hazards public notification in the City of Lakewood.

Transportation Plans –

West Colfax Avenue Vision 2040 Action Plan.

Community Resources Master Plan 2017

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

The purpose of this plan is to provide direction and guidance to the Department of Community Resources in managing the parks, recreation and cultural art services and facilities to meet the needs of current and future residents in the next five to ten years. This Plan is the result of an extensive master planning process that began with a needs assessment survey in 2006, followed by an extensive planning process consisting of an inventory of Department facilities; public and staff input; review of demographics, trends and benchmarking data; and analysis of programs and services and operations.

Sustainability Plan 2015

This document offers ambitious goals, detailed strategies, and concrete measurements aimed at advancing a culture of permanence where community leaders, businesses, and residents work together to ensure that Lakewood remains a healthy and vibrant place for generations to come.

A sample of some of the goals that relate to hazard mitigation include:

- Climate Change and Adaptation 1 – Minimize Lakewood's communitywide greenhouse gas emissions, and prepare and adapt to ongoing climate change impacts.



- Natural Systems 1 – Mitigate the negative effects of the built environment and human behavior on Lakewood’s natural systems to ensure biodiversity and enhance ecosystem services.
- Natural Systems 2 – Enhance Lakewood’s resilience to the impacts of climate change using green infrastructure and ecosystem-based adaptation.

The document includes specific targets, objectives and indicators, and implementation strategies to achieve each goal.

Lakewood Energy Assurance Plan 2012

The City of Lakewood Local Energy Assurance Plan (LEAP) is a guide for City staff and officials charged with the responsibility of ensuring the continuity of operations and health and safety of the citizens of the City during periods of energy emergencies. The overall goal of the LEAP is to enable Lakewood to be more resilient to energy disruptions as a community.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

The following relevant annexes have been incorporated into the City of Lakewood’s Emergency Operations Plan:

- City Wide Snow and Ice Response Plan
- City Wide Flood Plan
- City Wide Severe Winter Storm Plan
- Dam Failure Plans for:
 - East Reservoir
 - Main Reservoir
 - Smith Reservoir
 - Maple Grove Reservoir
 - Bear Creek Reservoir

City of Lakewood Emergency Operations Plan, June 2019

The Lakewood Emergency Operations Plan (EOP) provides general guidelines for planning, managing, and coordinating the overall response and recovery activities for the City to take before, during and after emergencies. The Plan was developed in accordance with the State of Colorado Disaster Emergency Act of 1992 and FEMA’s Comprehensive Preparedness Guide 101 and the Americans with Disabilities Act (Lakewood 2019). The EOP also defines the roles and responsibilities of each City department, agencies and enterprises during an emergency and disaster event. In addition, the 2019 EOP incorporated risk information including mapping and past events noted in the 2016 Multi-Hazard Mitigation Plan.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

- Bear Creek Reservoir was built by the Army Corp of Engineers to provide flood protection for Lakewood, Sheridan, Englewood, Denver, and areas downstream of Denver.

List of Stormwater Improvements

1. Weir Gulch at 9070 W Tennessee Avenue – Bank stabilization project along four properties to correct severe erosion.
2. McIntyre Gulch in Meadowlark Park – sediment removal to restore capacity of channel.
3. Nelson Street – W 17th Ave to W 20th Ave – storm sewer installation to reduce flooding of streets and private properties.
4. W 17th Place and Lee Street – Construction of new inlets, concrete pans and roadside swales to reduce flooding of streets and private properties in the area.



5. Weir Gulch at 8835 W Mississippi Avenue – Bank stabilization to correct severe bank erosion.
6. Weir Gulch at South Fenton Street – Bank stabilization to correct severe erosion and boulder wall construction to rebuild portion of the back yard.
7. Lakewood Gulch between Depew and Fenton – Bank stabilization to correct severe erosion along 5 properties.
8. McIntyre Gulch at Holland Street (between W 2nd and W 4th Avenues) – Existing 48” CMP culverts under Holland Street were replaced with a 38’ x 8’ reinforced concrete box culvert to eliminate overtopping of the roadway in a 100-year storm.
9. Dry Gulch at Lamar Street (between W 11th and W 13th Avenues) – Existing 60” CMP culvert under Lamar Street was replaced with a 14’ x 6’ reinforced concrete box culvert to eliminate overtopping of the roadway in a 100-year storm.
10. Independence Street – south of W 8th Avenue – New inlets and storm sewer were installed at the low point to reduce street flooding.
11. McIntyre Gulch at Xenon Street – channel was reconstructed with boulder check structures to eliminate erosion and excess sedimentation along the channel bottom.
12. McIntyre Gulch at 9035 & 9045 W 2nd Avenue – South channel bank and back yards were restored with a grouted boulder wall due to damage from a flood.
13. Lakewood Gulch between Depew and Fenton Streets – Bank stabilization to correct severe erosion.
14. Lakewood Gulch between approximately Independence and Garrison Streets – minor channel repairs at 4 locations to restore channel banks due to erosion.
15. McIntyre Gulch at S. Urban Street – Riprap installed along channel bottom to repair scour hole below box culvert outlet and along south bank to correct erosion.
16. South Lakewood Gulch upstream of Reed Street – sediment removal to restore capacity of channel.
17. Lakewood Gulch at Vance Street – sediment removal to restore capacity of channel.
18. Dry Gulch – Richey Park Forebay – north of W 13th Ave at approximately Dover St – sediment removal to restore volume of pond forebay.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

Routine - Public announcements via Channel 8, Looking at Lakewood, and educational brochures on:

- Flood Hazard
- Recycling
- Homeland Defense
- Emergency Preparedness

Opportunities for Enhancement

Based on the capability assessment, Lakewood has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Table 2-15 in the Base Plan shows the potential financial benefits from increasing the City’s Community Rating System class. The HMPC identified one improvement is to develop a floodplain management plan and research funding sources that have not been utilized in the past for mitigation projects. Other 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 will help to inform City staff and City Council on how to optimize integrating hazard information with mitigation projects, so City policies and duties continue to improve. Increasing City staff awareness of hazards and mitigation strategies will result in a better-informed cadre of professionals that can better communicate this information to the public.



D.7 Plan Implementation and Maintenance

The City of Lakewood has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the City will continue public participation in the plan maintenance process.

D.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The City of Lakewood recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, the 2016 Hazard Mitigation Plan was referenced in the City's Emergency Operations Plan (2019). Its noted as being an important planning element and background on the various natural hazard and irks to the City.

D.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Lakewood Office of Emergency Management will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. Lakewood Office of Emergency Management will also be responsible for representing the City on future Jefferson County HMPC meetings, and for coordination with city staff and departments during plan updates. The City, Fire District and Police Department will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by City Council.

The City of Lakewood will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

D.8 Mitigation Strategy

The City of Lakewood has adopted the hazard mitigation goals and objectives developed by the Planning Team and described in Section 6.2 of the Base Plan.

The City had six mitigation actions in the 2016 Plan, and has completed three of them:

- Revise Emergency Operations Plan (EOP) for Maple Grove Reservoir
- Lakewood Energy Assurance Plan Update
- Multi-Jurisdictional Storm Ready Program Participation

One action was deleted after having been identified as no longer relevant by the planning team:

- Burying Power Lines to Green Mountain Repeater Site

The remaining actions have been carried over into the 2021 Plan, along with six new actions.

D.8.1 National Flood Insurance Program

Recognizing the importance of the National Flood Insurance Program (NFIP) in mitigating flood losses, the City of Lakewood will place an emphasis on continued compliance with the NFIP. As an NFIP participant, the City has 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 as well as review of any potential development in special flood hazard areas.

D.8.2 Mitigation Actions

The local planning team identified and prioritized the following mitigation actions for the City of Lakewood based on the risk assessment. 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.



Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table D-29 City of Lakewood Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Lakewood 1	<p>Expand the existing Flood Hazard Inventory Tool (FHIT) for Lakewood Gulch, Weir Gulch, Sanderson Gulch, Sloan’s Lake Basin, Dry Gulch, Bear Creek Tributaries and small portions of drainages south of Bear Creek. The Flood Risk Assessment Tool would be used as a decision / planning tool to identify areas of risk in proportion to flood events and to develop flood mitigation and response actions. The flood assessment tool will include 10, 100 and 500 year flood events and will identify structures and their relative degree of flood risk. Additionally, the assessment tool will also provide 100/500 –year digital flood insurance rate maps, dam break inundation zone topography, satellite images and a Flood Alert Monitoring Network. It is envisioned that the development and testing of the Flood Hazard Inventory Tool will require several years to adequately develop prior to complete system-wide implementation. A FHIT will provide Lakewood with the ability to predict on a timely basis the impacts of severe flooding events.</p>	Dam Failure; Flood	1,2; S&S	Lakewood Department of Public Works and Emergency Management, Mile High Flood District	\$10,000 - \$100,000 Grants, Department Funding, Mile High Flood District	Medium	Phased in over a two year period of time.	In progress. Mile High Flood District completed migration of platform and database. Can now move forward on inputting high priority gulches and supporting data.
Lakewood 2	<p>Continue to implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The City of Lakewood participates in the National Flood Insurance Program. The City also participates in the Community Rating System and is a CRS Class 6. This project restates the City of Lakewood’s commitment to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated above the base flood elevation. This project also includes periodic reviews of the floodplain management ordinance to ensure that it is clear and up to date. Floodplain managers remain current on NFIP policies, and are encouraged to attend</p>	Flood	2; S&S	Lakewood Department of Public Works	Low Covered in existing budget	High	Ongoing	Annual Implementation



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	<p>appropriate training. Other activities that could be included in this effort are: Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance; Suggest changes to improve enforcement of and compliance with regulations and programs; Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps; Utilize recently completed Digital Flood Insurance Rate Maps (DFIRM) in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits. Continue to work with Mile High Flood District and Jefferson County to update and adopt DFIRM. Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the County, Mile High Flood District, and Colorado Water Conservation Board, and FEMA/NFIP. Evaluate activities that will improve Community Rating System ratings that may further lower the cost of flood insurance for residents, work with the City of Lakewood Stormwater utility to obtain funding to complete projects that can mitigate flood hazard areas. Address the five repetitive loss properties within the City of Lakewood. The City has made note of these problems and continues to address the flooding issues as capital improvement funds allow and as future development/redevelopment necessitates.</p>							
Lakewood 3	<p>Flood impact assessment tool and prediction system. Develop an operational web-based system that would be able to predict potential flooding impacts across the City and provide notifications to emergency response personnel. The tool would identify specific areas of concern (including homes, businesses, roadways, critical facilities, and others) based on identified threat thresholds using a GIS interface. This early warning would provide for both life safety and reduction in property losses due to flood damage.</p>	Dam Failure; Flood;	2; S&S;	Lakewood Emergency Management; Lakewood Public Works; Mile High Flood District	\$10,000 - \$100,000 Grants and Department Funding	Medium	3-4 years	New in 2021



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Lakewood 4	North Dry Gulch Improvements – Dover Street to Lamar Street. Prior to the Lakewood’s incorporation in 1969, development occurred along West Colfax Avenue and did not preserve most of the North Dry Gulch natural drainage channel. The existing drainage systems are inadequate for larger storms resulting in flooding of streets and private properties. This project will replace the inadequate storm sewer system with a large underground conduit and storm sewer laterals capable of conveying the 100-year storm event.	Flood;	2; S&S;	Lakewood Public Works; Mile High Flood District	More than \$1,000,000 Department budget, Mile High Flood District, other	High	Design in 2021-2022, Construction in phases beginning in 2022	New in 2021
Lakewood 5	Grid Resiliency. Renewable energy sources such as solar in combination with battery storage can provide uninterrupted power during times when the grid is disrupted for greater continuity and consistency of power. Such alternatives to grid energy could also reduce demand on infrastructure during periods of high usage, such as during heat waves. Also provides reduced energy costs for homeowners and businesses and allows greater self-reliance. Includes education/outreach with businesses and homeowners to make the switch to renewable energy easier to understand and coordinated with contractors.	Extreme Temperatures; Severe Winter Storms; Windstorm; Cyber	1; 2; 3; FWS; ENG; S&S;	Sustainability; Economic Development; Xcel Energy	Unknown Grants	Medium	Ongoing	New in 2021
Lakewood 6	Local Awareness of Climate Change Impacts. Climate change has impacted the intensity, frequency, and duration of many natural hazards (including drought, flooding, extreme temperatures, wildfire, and severe winter storms). Climate change also threatens the health of ecosystems and biodiversity, as well as human health as the rate of change is greater than many species can adapt to evolutionarily, which in turn can increase risk of landslides and flooding during rain events. Greenhouse gas emissions are widely recognized as a contributor to climate change due to their ability to trap heat in the Earth’s atmosphere. The city plans to engage in various efforts to increase awareness of the impacts of climate change on the Lakewood community: Continue regular GHG inventories for city operations and the community Develop a Climate Action Plan to identify additional mitigation and adaptation strategies	Drought; Extreme Temperatures; Flood; Hailstorm; Severe Winter Storms; Windstorm;	1; 2; 3; S&S; FWS; H&M; ENG; TRN; COM;	City of Lakewood Planning Department with City-wide collaboration	\$100,000 - \$1,000,000 Grants	High	2025	New in 2021



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	Participate in regional efforts to address climate issues Increase community outreach and education efforts and support programs for energy efficiency, renewable energy, electric vehicles, waste reduction, and similar strategies to reduce GHG emissions							
Lakewood 7	Identify socially vulnerable communities, and strengthen and expand community social networks to increase hazard awareness, preparedness, foster collaboration, communication and cooperation. Analyze data on social vulnerabilities throughout the city, with a focus on those areas identified in this plan as “Above Average” and “High” vulnerability, to develop more specific communication and mitigation actions that will enhance the ability of vulnerable communities to respond to hazards and climate impacts. Support existing neighborhood programs that increase social capital and enhance neighborhood identity, including Lakewood Linked, annual neighborhood organization registrations, the Neighborhood Participation Program, and the Sustainable Neighborhoods Program in order to reduce social isolation as a vulnerability in the event of a disaster. Conduct outreach, training, and awareness campaigns on hazards and climate impacts in the City. Continue to use Lakewood Linked to strengthen relationships between neighborhood residents, businesses, the faith community, and schools. Promote the formation of social resiliency circles where residents come together to increase personal security through learning, mutual aid, social action, and community support. Utilize the successful Eiber Resiliency Circle as a model to support the formation of similar groups.	Dam Failure; Drought; Extreme Temperatures; Flood; Hailstorm; Lightning; Severe Winter Storms; Tornado; Windstorm;	1; S&S;	City of Lakewood Planning; Emergency Management, Community Resources, and City Manager’s Office	\$50,000-\$100,000K; grant funding	Medium	Continuous	New in 2021
Lakewood 8	Cooling and carbon sequestration. Adapt to increased temperature and reduce carbon in the atmosphere through healthy vegetation, tree canopy coverage, and use of reflective materials (Implementation Strategy NS2-B of Lakewood Sustainability Plan).	Extreme Temperatures; Drought;	1; 2; 3; FWS; H&M;	Sustainability; Community Resources	\$100,000 - \$1,000,000 Grants	Medium	Ongoing	New in 2021

Annex E. City of Wheat Ridge

E.1 Background and Planning Process

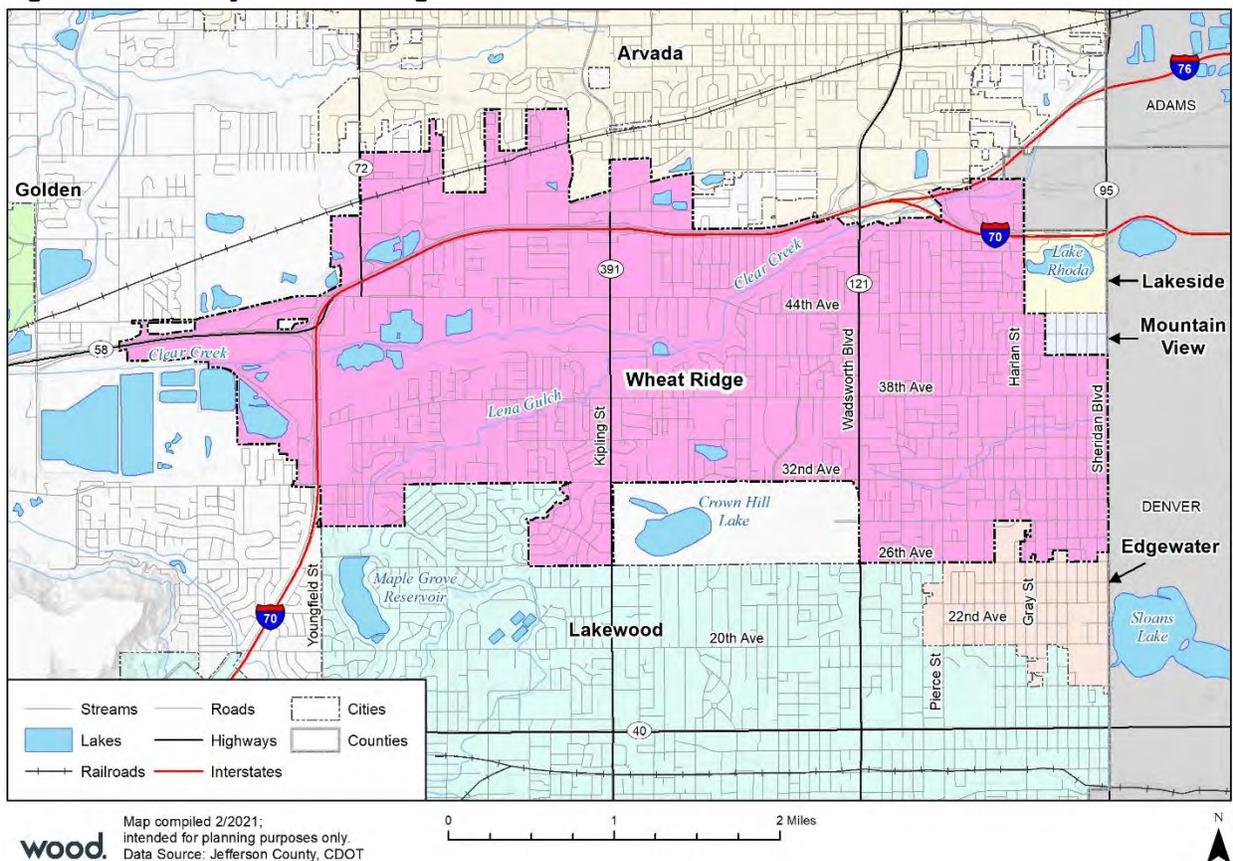
This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The City of Wheat Ridge fully participated in the 2021 update process as described in Section 3. The City had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section E.9. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the City on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

E.2 Community Profile

Figure E-1 shows a map of the City of Wheat Ridge.

Figure E-1 City of Wheat Ridge



E.2.1 History

The City of Wheat Ridge is a Home Rule Municipality located in Jefferson County, Colorado, United States. Wheat Ridge is a western suburb of Denver.

Wheat Ridge was founded as a community in 1859. During that year, a small group of farmers, some coming to Colorado in search of gold and silver, founded a rural village in this location. By the late 1800s, fertile soils and plentiful water led to the development of a small farming community. Up until World War

II, Wheat Ridge was a major supplier of fresh produce to the greater Denver area. However, during the 1940s and 1950s as the city evolved, carnation production became a major growth industry. For a time, Wheat Ridge was the largest producer of carnations throughout the world. Although commercial wheat production is a thing of the past, the ridges upon which much of this agricultural activity occurred remain, providing expansive views of the Front Range. Additionally, several greenhouses remain in the northwest metropolitan area. Each August, the city celebrates this heritage with the Carnation Festival. Started in 1970, the festival draws thousands of people to this premier civic event. The city was fully incorporated in 1969 as a statutory city when it was faced with annexation by surrounding cities. In 2019, the City celebrated its 50th birthday.

Today Wheat Ridge is home to approximately 31,000 residents – making it one of the smallest cities in the Denver metropolitan area. The City is an inner-ring suburb that affords residents with many of the conveniences of urban living, though the community still retains its small town character with a strong sense of community. Its slow growth, compared to adjacent suburbs, offers stark contrast to the region’s significant population growth over recent years. Residents enjoy easy access to I-70 and downtown Denver. The City is well known for its nationally recognized park and trail system and lush tree canopy. Wheat Ridge is a community with deep roots and short commutes.

E.2.2 Population

The U. S Census Bureau’s estimated 2019 population of Wheat Ridge was 31,331. Select Census and American Community Survey demographic and social characteristics are shown in Table E-1 through Table E-2.

Table E-1 Wheat Ridge Demographic and Social Characteristics

Wheat Ridge	2015	2019	% Change
Population	30,863	31,331	1.52%
Median Age	42.6	41.2	-3.3%
Total Housing Units	14,846	14,692	-1.0%
Housing Occupancy Rate	94.2%	95.8%	1.7%
% of Housing Units with no Vehicles Available	7.6%	6.3%	-17.1%
Median Home Value	\$256,900	\$383,900	49.4%
Unemployment Rate	7.9%	3.7%	-53.2%
Mean Travel Time to Work (minutes)	23.2	25.2	8.6%
Median Household Income	\$47,841	\$57,659	20.5%
Per Capita Income	\$30,531	\$35,956	17.8%
% of Individuals Below Poverty Level	13.6%	12.9%	-5.1%
% Without Health Insurance	13.6%	5.8%	-57.4%
# of Households	13,978	14,080	0.7%
Average Household Size	2.2	2.2	0.5%
% of Population Over 25 with High School Diploma or Higher	88.8%	91.3%	2.8%
% of Population Over 25 with Bachelor’s Degree or Higher	31.5%	35.8%	13.7%
% with Disability	14.1%	14.1%	0.0%
% Speak English less than "Very Well"	3.6%	2.2%	-38.9%

Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Table E-2 Wheat Ridge Demographic & Social Characteristics Compared to the County & State

Demographic & Social Characteristics (as of 2019)	Wheat Ridge	County	Colorado
Median Age	41.2	40.3	36.7
Housing Occupancy Rate	95.8%	96.4%	90.0%
% of Housing Units with no Vehicles Available	6.3%	3.9%	5.1%
Median Home Value	\$383,900	\$397,700	\$343,300
Unemployment	3.7%	3.6%	4.3%
Mean Travel Time to Work (minutes)	25.2	28	25.8
Median Household Income	\$57,659	\$82,986	\$72,331
Per Capita Income	\$35,956	\$44,119	\$38,226
% of Individuals Below Poverty Level	12.9%	7.1%	10.3%
% Without Health Insurance	5.8%	5.5%	7.6%
Average Household Size	2.2	2.40	2.56
% of Population Over 25 with High School Diploma or Higher	91.3%	94.5%	91.7%
% of Population Over 25 with bachelor's degree or Higher	35.8%	45.2%	40.9%
% with Disability	14.1%	10.0%	10.6%
% Speak English less than "Very Well"	2.2%	3.0%	5.8%

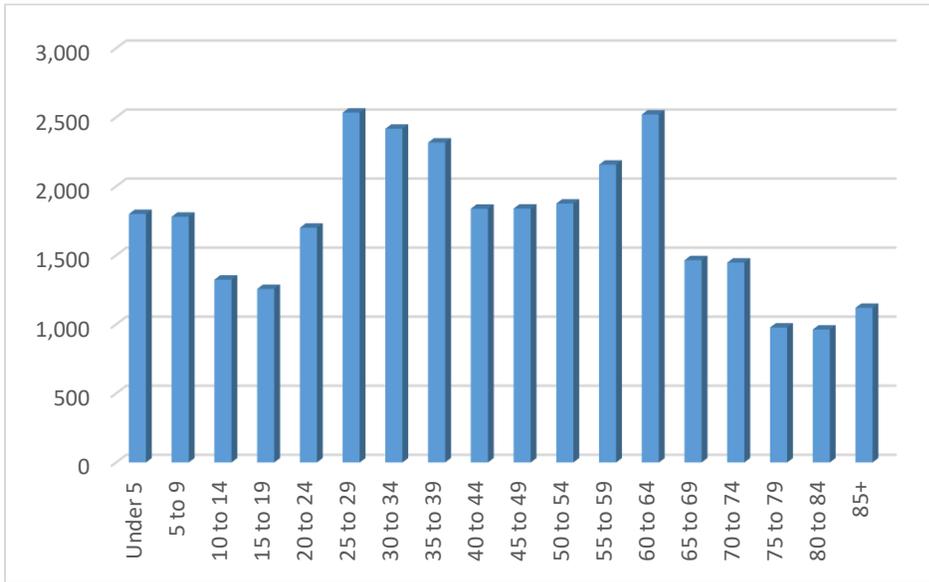
Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Table E-3 Wheat Ridge Demographics by Race and Sex

Wheat Ridge	Population	%
Total Population	31,331	
Male	15,256	48.7%
Female	16,075	51.3%
White, not Hispanic	23,111	73.8%
Hispanic or Latino	6,701	21.4%
Black	309	1.0%
Asian	350	1.1%
American Indian and Alaska Native	82	0.3%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	170	0.5%
Two or more races	608	1.9%

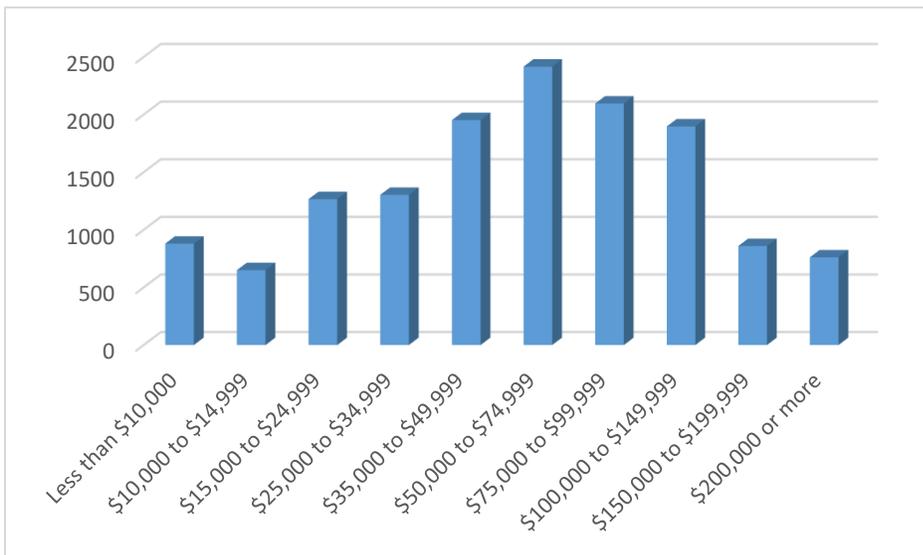
Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Figure E-2 Wheat Ridge Population Distribution by Age



Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

Figure E-3 Wheat Ridge Income Distribution



Source: U.S. Census Bureau American Community Survey, 5-Year Estimates 2015-2019

E.2.3 Social Vulnerability

Social vulnerability scores for the entirety of Jefferson County can be seen in Figures 2-2 through 2-6 in Section 2 of the Base Plan. Wheat Ridge’s overall social vulnerability is above average compared to the rest of Jefferson County and Colorado as a whole. In particular, Wheat Ridge’s vulnerability ranks above high in the household composition and disability vulnerability category, and above average in the housing and transportation and socioeconomic vulnerability categories. However, the City’s vulnerability ranks low in the minority status and language vulnerability category. Resources and measures to reduce the social determinants of disasters may be most effectively allocated to these areas. Moreover, it is critical that the

City analyze the individual social vulnerability indicators that make those parts of the community stand out. Through ongoing evaluation, the City of Wheat Ridge will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

E.2.4 Growth and Development Trends

Table E-4 shows the various types and amounts of housing units in the City of Wheat Ridge based on data from the American Community Survey Five Year Estimates for 2015-2019. As shown in the table, most housing units (52.1%) are single family homes (1-unit detached) in Wheat Ridge.

Table E-4 City of Wheat Ridge Types and Total Housing Units

Type of housing units	Total	%
Total housing units	14,692	
1-unit detached	7,658	52.1%
1-unit attached	1,615	11.0%
2 units	522	3.6%
3 or 4 units	887	6.0%
5 to 9 units	1,001	6.8%
10 to 19 units	1,343	9.1%
20 or more units	1,647	11.2%
Mobile home	7	0.0%
Boat, RV, van, etc.	12	0.1%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table E-5 illustrates how Wheat Ridge has grown in terms of population and number of housing units between 2015 and 2019. The table illustrates that Wheat Ridge is undergoing moderate population growth but is losing housing stock.

Table E-5 Wheat Ridge's Change in Population and Housing Units, 2015-2019

2015 Population	2019 Population Estimate	Percent Change 2015-2019	2015 # of Housing Units	2019 Estimated # of Housing Units	Estimated Percent Change 2015-2019
30,863	31,331	+1.52%	14,846	14,692	-1.0%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Most of the City is already developed; however, much of the developed areas are older and are slowly undergoing redevelopment. All redevelopments are complying with current codes, so the regulations are being followed in the identified hazard areas, i.e., floodplains. The only area available for new growth is on the west side of the City. Again, any developments in this area will also comply with the current codes, including those regulating identified hazard areas.

According to the HMPC, Wheat Ridge has seen 3 new apartment communities constructed since 2016, with 2 more starting soon. In addition, over 1,000 new townhome units have been or are being constructed. All of this development is occurring in areas of low risk for avoidable natural hazards.

E.2.5 Natural, Cultural, and Historic Resources

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

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Natural resources of importance in Wheat Ridge include the 42 sites that are parks, open space, recreation centers, or areas of visual green space totaling approximately 430 acres. Of this, 7 sites are neighborhood parks (49.20 acres), and 7 sites are pocket parks (8.0 acres). Two park sites in the city are community parks (66.0 acres). These two community parks also serve as neighborhood parks for residents living nearby, which is generally considered within a 0.5-mile radius. There is also 1 dedicated sports complex in the city (16.0 acres), 1 natural area (9.0 acres), 1 open space area (250.0 acres), and 17 areas of visual green space (0.87 acre). For information about natural resources in Jefferson County, which includes Wheat Ridge, see Section 4.2.3 of the Base Plan.

Historic and Cultural Resources

Table E-6 lists the properties in Wheat Ridge that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties; for more information about these registers, see Section 4.2.3 of the Base Plan.

Table E-6 Wheat Ridge’s Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
James H Baugh House	11361 W 44 th Ave	8/14/12
Crown Hill Burial Park	7777 W. 29 th Ave.	7/24/08
Fruitdale Grade School	10801 W 44 th Ave	3/20/2013
Pioneer Sod House	4610 Robb St	03/14/1973
Richards Mansion	5349 W 27 th Ave	9/15/1977
Wheat Ridge Post Office	4610 Robb Street	State Register 8/12/1992

Sources: <http://www.nps.gov/nr/>

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. There are currently no Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) buildings in the City of Wheat Ridge.

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.

E.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the City of Wheat Ridge using the same methodology as in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction’s risk and vulnerabilities from that of the overall County.

Table E-7 lists the significance of each hazard for the City of Wheat Ridge based on the updated risk assessment and planning team input. The highest risk hazards were determined to be dam failure, flood, pandemic, and tornado.

Table E-7 City of Wheat Ridge – Hazards Summary

Hazard	Geographic Extent	Frequency	Severity	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Limited	Occasional	Negligible	Low
Dam Failure	Limited	Occasional	Critical	High
Drought	Extensive	Likely	Negligible	Low
Earthquake	Extensive	Unlikely	Negligible	Low
Erosion and Deposition	Limited	Highly Likely	Negligible	Low
Expansive Soils	Limited	Likely	Negligible	Low
Extreme Temperatures	Extensive	Highly Likely	Negligible	Low
Flood	Significant	Occasional	Critical	High
Hailstorm	Extensive	Likely	Limited	Medium
Landslides, Debris/Rockfalls	Limited	Unlikely	Negligible	Low
Lightning	Limited	Likely	Negligible	Low
Pandemic	Extensive	Unlikely	Catastrophic	High
Severe Winter Storms	Extensive	Highly Likely	Limited	Medium
Subsidence	Limited	Unlikely	Negligible	Low
Tornado	Significant	Likely	Critical	High
Wildfire	Significant	Occasional	Limited	Medium
Windstorm	Extensive	Likely	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Severity/Magnitude <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p> <p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. Also used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. Also used for hazards with a high impact rating but an extremely low frequency. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. Also used for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>				

E.4 Community Asset Inventory

Table E-8 shows the total number of improved parcels, properties, and their improvement and content values for the City of Wheat Ridge. See Section 4.2 of the Base Plan for details and methodology.

Table E-8 Wheat Ridge's Property Inventory

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Agriculture	2	2	\$22,618	\$22,618	\$45,236
Commercial	414	723	\$416,007,224	\$416,007,224	\$832,014,448
Exempt	59	76	\$114,136,176	\$114,136,176	\$228,272,352
Industrial	279	391	\$214,853,118	\$214,853,118	\$429,706,236
Mixed Use	134	172	\$57,727,100	\$57,727,100	\$115,454,200
Residential	10,277	12,141	\$2,832,819,972	\$1,416,409,986	\$4,249,229,958
Total	11,165	13,505	\$3,635,566,208	\$2,219,156,222	\$5,854,722,430

Source: Jefferson County Assessor's Office

E.4.1 Other Assets

Table E-9 is a detailed inventory of assets identified by the City's planning team. This inventory includes some critical facilities. For more information about how "critical facility" is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table E-9 Summary of Wheat Ridge's Assets

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Exempla Lutheran Medical Campus		400 beds	Tornado
Wheat Ridge Medical Offices - Kaiser			Tornado
City Hall – Police			Tornado
Wheat Ridge Fire Station #1			Tornado
Wheat Ridge Fire Station #2			Tornado
Maintenance Facility			Tornado
Maple Grove Reservoir		550 AF	Flood, Dam Failure
Wheat Ridge High School		1,275	Tornado
Everitt Middle School		487	Tornado
Wheat Ridge Middle School		366	Tornado
Prospect Valley Elementary School		476	Tornado
Stevens Elementary School		411	Tornado
Wilmore-Davis Elementary School		283	Tornado
Pennington Elementary School		277	Tornado
Kullerstand Elementary School		267	Tornado
Martensen Elementary School		252	Tornado
Compass Montessori Charter School		661	Tornado
Saint Peter & Paul Catholic School		351	Tornado
Beth Eden Baptist School		233	Tornado
Foothills Academy		190	Tornado
Wheat Ridge Christian Academy		45	Tornado
Norma Anderson Preschool		113	Tornado
Kids in Action Preschool		80	Tornado
Alpine Valley Preschool		27	Tornado
Mountain Vista Health Center		168 Beds	Tornado
Highland West Apartments		120 Beds	Tornado
Sandalwood Manor		85 Beds	Tornado
Wheat Ridge Manor Nursing Home		81 Beds	Tornado
Christopher House		76 Beds	Tornado
Vista Village Assisted Living		54 Beds	Tornado
Wheat Ridge Assisted Living		46 Beds	Tornado
Spring Ridge Park		37 Beds	Tornado
Wide Horizon		37 Beds	Tornado

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Verandas Assisted Living at Wheat Ridge		48 Beds	Tornado
21 Other Nursing Homes		178 Beds	Tornado
Interstate 70		135,000 ADT	Winter Weather
State Highway 95 (Sheridan Boulevard)		35,000 ADT	Winter Weather
State Highway 121 (Wadsworth Boulevard)		50,000 ADT	Flood, Winter Weather
State Highway 391 (Kipling Street)		50,000 ADT	Flood, Winter Weather
State Highway 72 (Ward Road)		35,000 ADT	Winter Weather
State Highway 58		26,000 ADT	Winter Weather
Kipling Bridge over Clear Creek		50,000 ADT	Flood, Winter Weather
Wadsworth Bridge over Clear Creek		50,000 ADT	Flood, Winter Weather
44th Avenue Bridge over Clear Creek		14,000 ADT	Flood, Winter Weather
Youngfield Avenue Bridge over Clear Creek		25,000 ADT	Flood, Winter Weather
Interstate 70 Bridge over Clear Creek		85,000 ADT	Flood, Winter Weather
BNSF Railroad			Winter Weather
Emergency Warning System		NA	Hailstorm, Tornado, Windstorm
Clear Creek Greenbelt		250 Acres	Drought, Erosion, Flood, Hailstorm, Lightning, Tornado, Wildfire
Spiranthes Diluvialis (Ute Ladies-Tresses Orchid)		<20 Acres	Drought, Flood, Hailstorm, Wildfire
Mycenastrum Corium (Earth Star Fungus)		< 1 Acre	Drought, Flood, Wildfire
Wetlands		100 Acres	Drought, Flood, Hailstorm, Wildfire
Baugh House			Tornado
Sod House			Tornado
Richards-Hart Estate		75	Tornado

Many of the facilities listed above are also in GIS databases provided by the City of Wheat Ridge and Jefferson County. Critical facility counts and types are shown in Table E-10. Shelters may be in facilities such as schools or recreation centers.

Table E-10 Summary of Wheat Ridge’s Critical Facilities in GIS

FEMA Lifeline	Facility Type	Facility Count
Communications	Land Mobile Private Towers	18
	Microwave Service Towers	49
	Paging Transmission	1
	Total	68
Energy	Electric Substation	1
	Total	1
Hazardous Materials	Tier II	11
	Total	11
Health and Medical	Hospital	1
	Nursing Home	23
	Total	24
Safety and Security	EOC	1
	Fire Station	4
	Government Facility	3
	Law Enforcement	1
	School	13
	Total	22
Transportation	Aircraft Facility	1
	Bridge	34
	Total	35
	Grand Total	161

Source: HFLD, Jefferson County

E.5 Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the City of Wheat Ridge, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the City's risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soils
- Extreme Temperatures
- Hailstorm
- Lightning
- Tornado
- Windstorm
- Winter Storm
- Cyber Attack
- Pandemic/Public Health

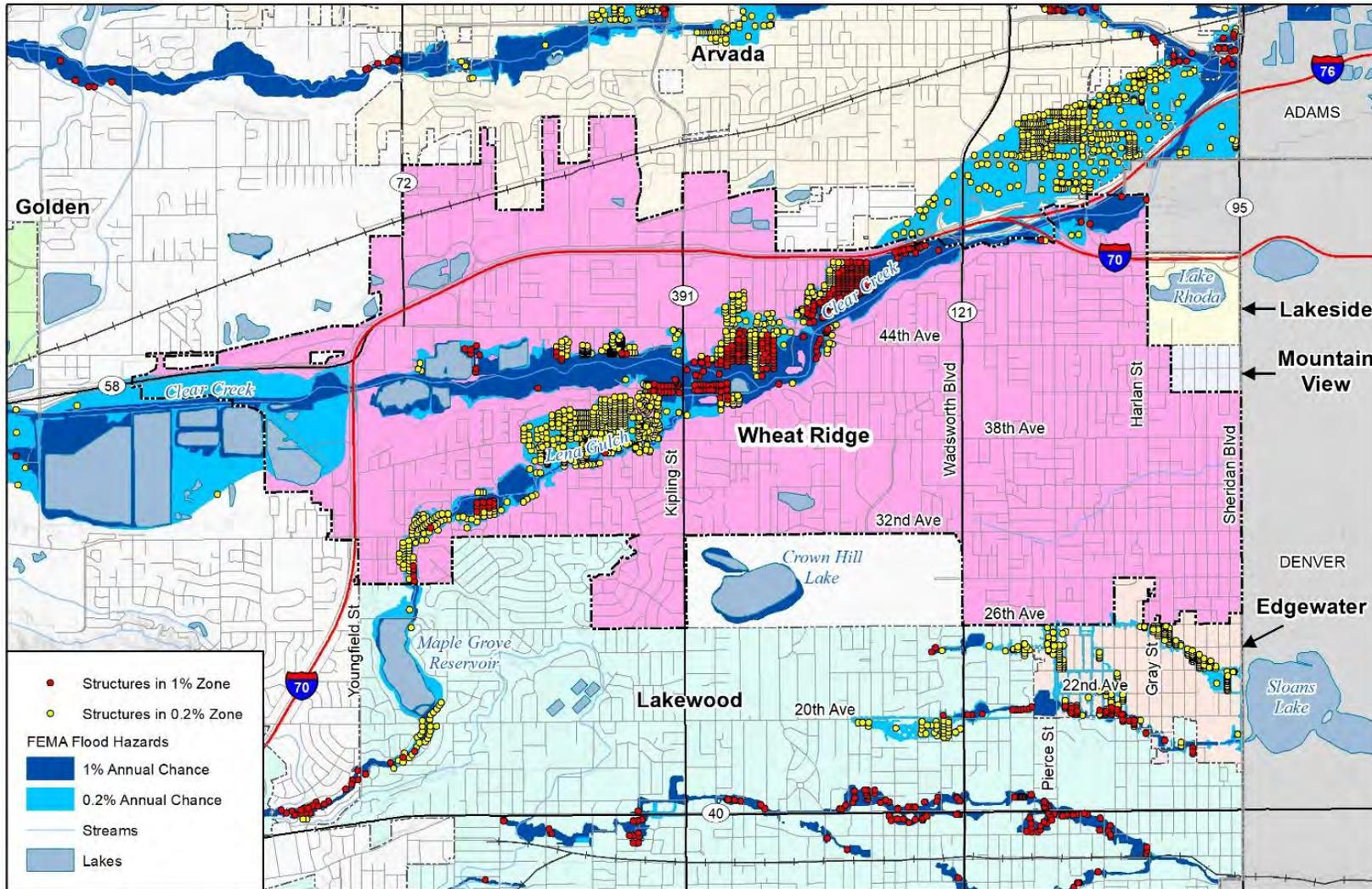
This section details vulnerability to specific hazards, where quantifiable, and where it differs from that of the overall County. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas. For a discussion of the methodology used to develop the loss estimates refer to Section 4.3 of the Base Plan.

E.5.1 Flood

According to the vulnerability assessment conducted using GIS, Wheat Ridge has one of the higher potentials for economic loss from flooding in the County. Clear Creek flows through Wheat Ridge, and there is also risk from Lena Gulch that crosses the City. Note that this is based on computer modeling that may not reflect specific mitigation activities.

Figure E-4 depicts the FEMA flood zones (1% annual chance and 0.2% annual chance) as well as all the at-risk properties in Wheat Ridge.

Figure E-4 Wheat Ridge Flood Hazards and Properties At-Risk



wood.

Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

Table E-11 shows the total parcels and buildings at risk to the 1% annual chance flood and Table E-12 shows the values at risk in the same flood scenario. For this analysis, content values were estimated based on prevailing land use and a multiplier was applied to building and content values to estimate losses to each. See Section 4 Hazard Profiles for details on methodology. According to the analysis, 414 buildings (364 of which are residential) are at risk, totaling \$42.2 million of damage to buildings and contents.

Table E-11 City of Wheat Ridge Buildings At-Risk to 1% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Total Loss Estimate
Commercial	8	12	\$2,593,423	\$2,593,423	\$5,186,846	\$1,296,712
Exempt	4	6	\$497,426	\$497,426	\$994,852	\$248,713
Industrial	11	32	\$6,619,031	\$9,928,547	\$16,547,578	\$4,136,894
Residential	310	364	\$97,448,413	\$48,724,207	\$146,172,620	\$36,543,155
Total	333	414	\$107,158,293	\$61,743,602	\$168,901,895	\$42,225,474

Source: Jefferson County Assessor

Table E-12 shows the parcels and buildings at risk to the 0.2% annual chance flood and Table E-13 shows the values at risk in the same flood scenario. For this analysis, content values were estimated based on prevailing land use and a multiplier was applied to building and content values to estimate losses to each. See Section 4 Hazard Profiles for details on methodology. According to the analysis, 1,027 buildings (975 of which are residential) are at risk, totaling \$112.6 million in damage to buildings and contents over and above the 0.2% scenario. Note that this analysis does not account for properties which may have been built in accordance with local floodplain regulations and mitigated to the 1% annual chance flood.

Table E-12 City of Wheat Ridge Buildings At-Risk to 0.2% Annual Chance Flood

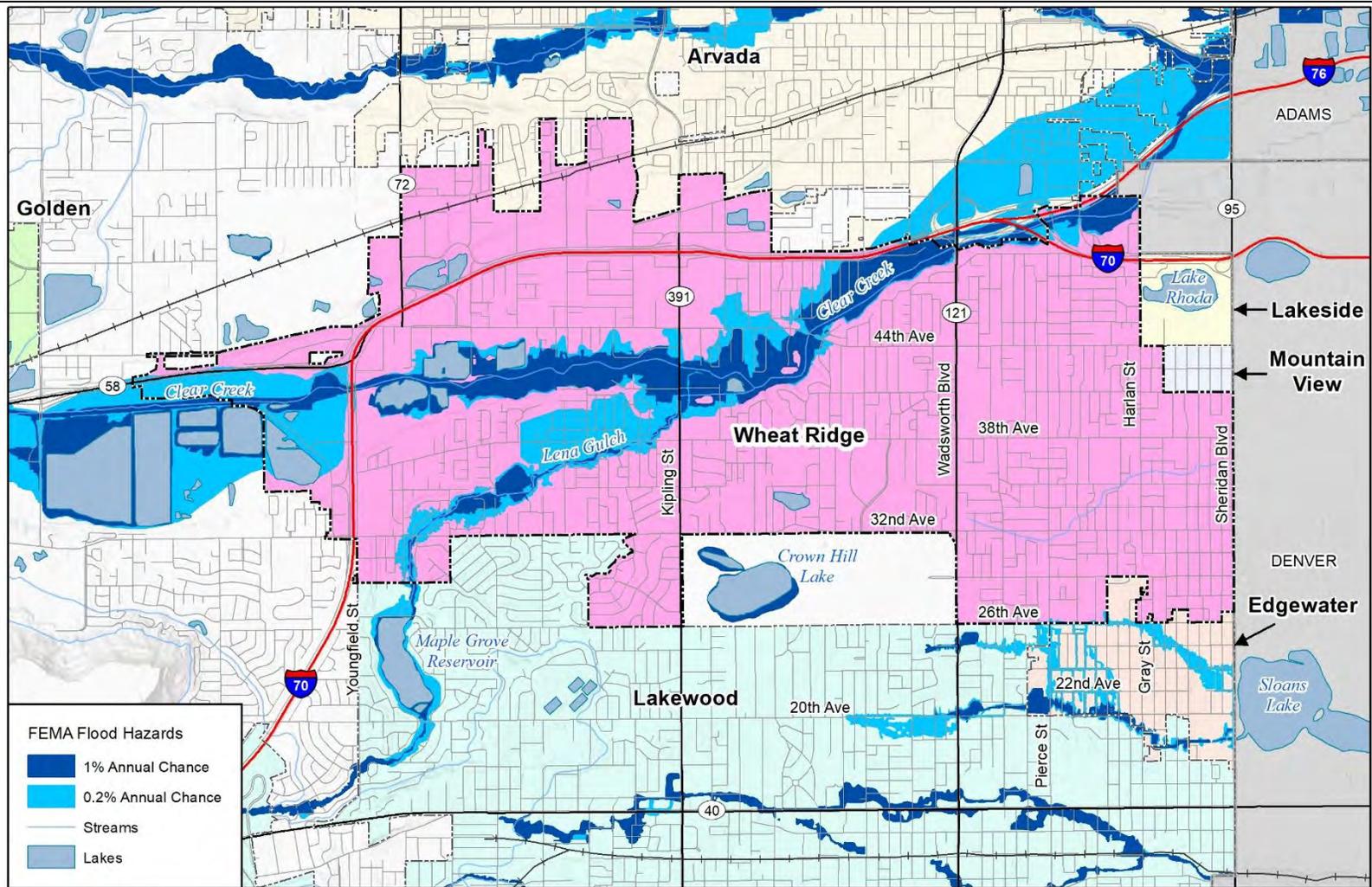
Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Total Loss Estimate
Agriculture	1	1	\$11,380	\$11,380	\$22,760	\$5,690
Commercial	30	38	\$29,597,739	\$29,597,739	\$59,195,478	\$14,798,870
Exempt	2	2	\$333,766	\$333,766	\$667,532	\$166,883
Industrial	4	7	\$3,171,115	\$4,756,673	\$7,927,788	\$1,981,947
Mixed Use	4	4	\$939,180	\$939,180	\$1,878,360	\$469,590
Residential	737	975	\$253,897,472	\$126,948,736	\$380,846,208	\$95,211,552
Total	778	1,027	\$287,950,652	\$162,587,474	\$450,538,126	\$112,634,531

Source: Jefferson County Assessor

Figure E-5 shows the FEMA flood zones for the City of Wheat Ridge.

For the City of Wheat Ridge, this analysis showed that there are 12 critical facilities in the 1% annual chance flood zone, 8 of which are bridges (Table E-13). The analysis also showed that there are 17 additional critical facilities in the 0.2% annual chance flood zone (), mostly in the northeastern portion of the City.

Figure E-5 City of Wheat Ridge Flood Hazards



FEMA Flood Hazards

- 1% Annual Chance
- 0.2% Annual Chance
- Streams
- Lakes



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021

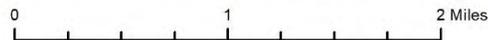


Table E-13 City of Wheat Ridge Critical Facilities in 1% Annual Chance Floodplain

Jurisdiction	FEMA Lifeline	Facility Type	Facility Count
Wheat Ridge	Communications	Microwave Service Towers	4
	Transportation	Bridge	8
	Total		12

Source: Jefferson County Assessor, HFLD

Table E-14 City of Wheat Ridge Critical Facilities in 0.2% Annual Chance Floodplain

Jurisdiction	FEMA Lifeline	Facility Type	Facility Count
Wheat Ridge	Communications	Land Mobile Private Towers	2
	Health and Medical	Nursing Home	1
	Safety and Security	Fire Station	1
	Safety and Security	Government Facility	1
	Transportation	Bridge	12
	Total		17

Source: Jefferson County Assessor, HFLD

Previous Flood Events

Through the Data Collection Guide, the City of Wheat Ridge noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Jefferson County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction.

The events noted by this jurisdiction in the Data Collection Guide include:

April 2015 thru Early July 2015 Heavy Rains and Flooding

During this period, the City received rainfall almost equal to its annual average. During just the 8 weeks from mid-April to mid-June, the City received 13.5 inches of rainfall. Basement flooding was reported throughout the City due to the high groundwater that resulted.

September 2013 Localized Flooding

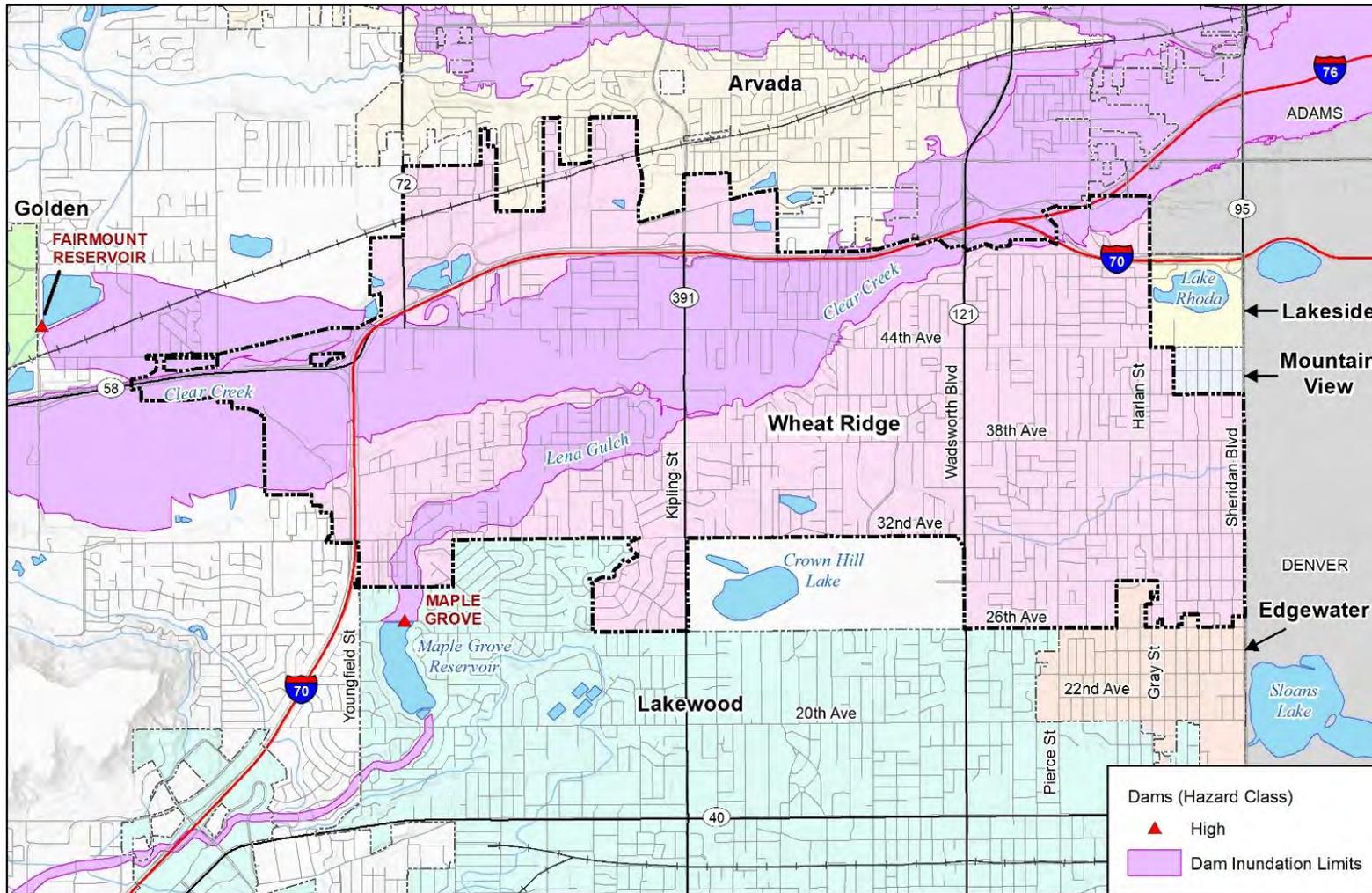
Although the City was spared the impacts of the week-long rainfall that inundated northern Colorado, one afternoon a localized thunderstorm passed over the central part of the City dropping around 2.5 inches of rain and small hail in about an hour. Local flooding occurred in several areas with several basements being flooded. Clear Creek at the bridge over Kipling was very close to the underside of it due to high flows but was never overtopped.

E.5.2 Dam Failure

According to the analysis of dams, Wheat Ridge has one High Hazard dam (Maple Grove Dam) whose failure could impact life and/or property. The Fairmount Reservoir Dam, also a High Hazard Dam, is located immediately to the west of the City of Wheat Ridge, see Figure E-6. Note that there are several dams west of Jefferson County that could impact Clear Creek if they failed. These are noted as impacting Golden first in Section 4 of the Base Plan, but they would also impact Wheat Ridge.

Note: Hazard class does not indicate dam condition, it merely indicates risks in case of failure. A high hazard dam poses risk to both life and property, a significant hazard dam only poses a risk to property. See discussion the Section 4 of the Base Plan.

Figure E-6 Wheat Ridge Dam Inundation Risk



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety



Previous Dam Failure Events

Through the Data Collection Guide, the City of Wheat Ridge noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Jefferson County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction.

The events noted by this jurisdiction in the Data Collection Guide include:

1979 Dam Failure

On March 17, 1979, the fabridam, a type of inflatable dam, was punctured by an unknown, sharp object. It was determined to be most likely due to vandalism. Vandalism of fabridam spillway for the Maple Grove Dam caused an unscheduled release of 100 acre-ft of water from the Maple Grove Reservoir in about 3 hours. Flooding occurred from the Dam south of 32nd Avenue to the confluence with Clear Creek. The fabridam spillway was replaced in 2004 with a more vandal resistant structure.

E.5.3 Geologic Hazards

Wheat Ridge has some very limited exposure to landslide. There is a small area of risk in the northwest corner of the City, between Mt. Olivet Cemetery and Ward Road Pond. Wheat Ridge’s proximity to the Golden Fault as a potential, though unlikely, earthquake source make it more vulnerable to earthquake damage.

E.5.4 Wildfire

While not a foothills community, Wheat Ridge does have some risk to wildfires, particularly along the Clear Creek riparian area, see Figure E-7. According to the GIS based analysis of wildfire, Wheat Ridge has 580 improved parcels and 658 buildings exposed to the lowest wildfire risk area. Together, these properties represent a value of approximately \$364 million. Wheat Ridge also has a total of 8 critical facilities at risk to wildfire, see Table E-15.

Table E-15 Wheat Ridge Critical Facilities At-Risk to Wildfire

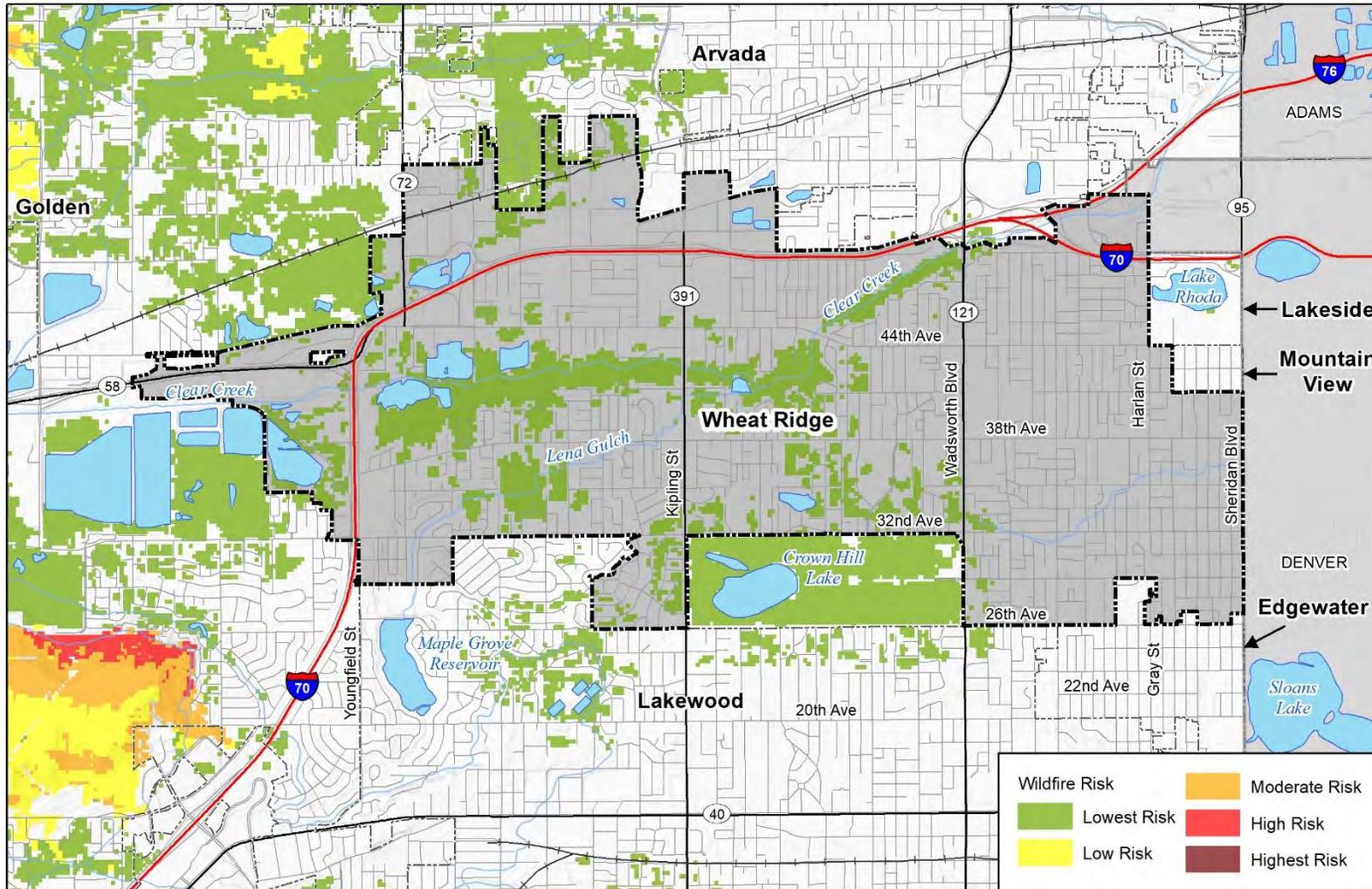
FEMA Lifeline	Facility Type	Facility Count
Communications	Land Mobile Private Towers	1
Communications	Microwave Service Towers	4
Hazardous Material	Tier II	1
Health and Medical	Nursing Home	1
Safety and Security	Fire Station	1
Total		8

Source: Wood analysis on data provided by Jefferson County, COWRAP

E.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, lightning, tornado, and windstorm the entire building inventory and population in the City is potentially exposed. That is the reason for the asset inventory provided in Section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory. The urban forest present across much of Wheat Ridge can be prone to windstorms and winter storms. These storms occasionally cause large cottonwoods or tree limbs to impact power lines and properties.

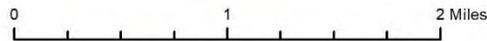
Figure E-7 City of Wheat Ridge COWRAP Wildfire Risk



Wildfire Risk	Lowest Risk	Moderate Risk	High Risk
	Low Risk	Highest Risk	



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado State Forest Service COWRAP



Previous Hazard Events

Through the Data Collection Guide, the City of Wheat Ridge noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Jefferson County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction.

The events noted by this jurisdiction in the Data Collection Guide include:

May 8, 2017 Severe Thunderstorm and Large Hail

A severe afternoon thunderstorm impacted the Denver Metropolitan area, significantly impacting Jefferson County. Specific to the City of Wheat Ridge, damage to City owned facilities amounted to \$2.2 million to buildings and \$600,000 to City owned vehicles. 7,500 roofing permits were issued related to the hailstorm with a total valuation of \$212 million. Minor injuries were anecdotally reported, however there were no known hospitalizations in Wheat Ridge.

July 2009 Hail/Windstorm

A severe thunderstorm produced damaging winds, large hail, and very heavy rain across the western and southern suburbs of Denver. Widespread damage was observed in the City of Wheat Ridge. The intense straightline winds were the result of a wet microburst which downed hundreds of trees and snapped power poles. Winds gusts to 80 mph were reported along with nickel to golf ball size hail. The combination of wind and hail produced widespread damage to homes and vehicles. Many Wheat Ridge residents were left without power. Minor injuries were reported from broken glass during the storm, but no one was hospitalized. The City suffered an estimated \$600,000 in damage to City property.

E.6 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. Wheat Ridge's regulatory, administrative, and technical, and fiscal mitigation capabilities are summarized in Section 2.7 of the Base Plan.

National Flood Insurance Program

The City of Wheat Ridge joined the National Flood Insurance Program (NFIP) on May 26, 1972 and the Community Rating System (CRS) on October 1, 1991. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in communities that provide extra measures of flood above the minimum NFIP requirements. As of December 2020, Wheat Ridge had a CRS class rating of 5 (one a scale of 1-10, 1 being the best). This rating provides a 25 percent discount for policyholders within a special flood hazard area (SFHA) and a 10 percent discount for those outside of an SFHA.

NFIP insurance data indicates that as of December 2020, there were 219 (down from 219 policies in 2015) policies in force in Wheat Ridge, resulting in \$54,870,100 of insurance in force. In Wheat Ridge, there have been 45 historical claims (up from 44 historical claims in 2015) for flood losses totaling \$97,251. At the time this plan was developed there were no repetitive or severe repetitive loss structures as defined by the NFIP.

Mapping: Wheat Ridge's initial Flood Insurance Rate Map became effective on 5/26/1972. The most current Digital Flood Insurance Rate Maps were updated and became effective on 2/5/14.

Wheat Ridge's municipal codes and ordinances have been updated to reflect the most current mapping. DFIRMs have been used by the City for both floodplain management and risk assessment purposes.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

2009 City of Wheat Ridge Comprehensive Plan

The City's comprehensive plan is a guide to help the City make decisions and establish its future direction. The goals and policies contained within the plan cover a broad range of subjects matter related to services, issues, and geographic areas within Wheat Ridge. Combined, these elements serve to direct future policy decisions to preserve vital community attributes and service levels and manage growth. The goals and policies were defined in the original 2000 Plan and remained unchanged in the Plan Addendums. The Plan Addendums each focus on new or changing development in Wheat Ridge.

The following goals and related polices that are relevant to this hazard mitigation plan are excerpted here:

- Goal CS 2 – Continue investment in parks, recreation, and open space. Wheat Ridge will maintain and continue to invest in providing quality parks, open space, and recreation facilities that are accessible to all neighborhoods and residents, using the Parks and Recreation Master Plan to guide investment and locations.
 - CS 2.1 – Parks, Recreation and Open Space. The City, in coordination with Jefferson County, Jefferson County Schools, and other organizations will continue to maintain and enhance parks, recreation, and open space offerings and facilities.
- Goal CS 4 – Continue coordination with fire districts and utility providers to maintain quality service. The City will continue to coordinate with utilities and fire districts to maintain quality levels of service to existing customers and provide new services to areas where future growth will occur.
 - CS 4.1 – Utility and Service Districts. The City will continue to coordinate development and redevelopment activities with utility providers and service districts.
- Goal SF 2 – Protect and preserve natural assets. Wheat Ridge will protect and conserve its natural, scenic, and environmental assets including the urban tree canopy, Wheat Ridge Greenbelt, Lena Gulch, and other drainage ways.
 - SF 2.1 – Natural Resource Stewardship. The City will continue to work with Jefferson County to provide stewardship of unique and sensitive natural resources and areas.

Wheat Ridge Weed Management Program (2003) The Wheat Ridge Parks and Recreation Department uses integrated pest management, a decision-making process that selects, integrates, and implements control methods to prevent or manage noxious weeds. The Weed Management Plan focuses on long-term prevention or suppression of undesirable species while reducing the impact that control techniques may have on the environment, human health, and non-target species. The Weed Management Plan is an integral part of the Wheat Ridge Open Space Management Plan.

Municipal Code

E.6.1.1.1 Section 26, Article 8: Floodplain Management

The City adopted several revisions to the floodplain ordinance on January 13, 2014, that went into effect on January 28, 2014 (Ordinance 1544). These changes involved adopting new state regulations and new floodplain maps and incorporating minor changes to update the language in the ordinance to current standards.

There were two new state regulations that the City adopted that included:

1. The freeboard requirement is the minimum height above the flood elevation for most buildings. This requirement has been set at two feet for critical facilities.

2. Certain areas that are removed from the floodplain by using fill materials, would still be regulated as if they are still in a floodplain with respect to freeboard. This essentially means that basements would not be allowed in those areas.

An excerpt from the municipal code is provided here. The city council hereby finds it in the public interest, and in the furtherance of the public health, safety and welfare, that the following objectives be fulfilled:

- To promote the public health, safety and general welfare, to minimize flood losses in areas subject to flood hazards, and to promote wise use of the “Flood Regulatory District” by:
 - Prohibiting certain uses which are dangerous to life or property in time of flood.
 - Restricting uses which would be hazardous to the public health in time of flood.
 - Restricting uses which are so particularly susceptible to flood damage, so as to alleviate hardship and reduce demands for public expenditures for relief and protection.
 - Restricting permitted Flood Regulatory District uses, including public facilities which serve such uses, to be protected against floods by providing floodproofing and general flood protection at the time of initial construction.
- To protect occupants of the Flood Regulatory District from a flood which is or may be caused by their own, or other, land use and which is or may be undertaken without full realization of the danger through:
 - Regulating the manner in which structures designed for human occupancy may be constructed so as to prevent danger to human life within such structures.
 - Regulating the method of construction of water supply and sanitation systems so as to prevent disease, contamination and unsanitary conditions.
 - Delineating and describing areas that could be inundated by floods so as to protect individuals from purchasing lands for purposes which are not in fact suitable.
 - Ensuring that potential buyers are notified that property is in an area of special flood hazard.
 - Ensuring that those who occupy the areas of special flood hazards assume responsibility for their actions.
- To protect the public from the burden of extraordinary financial expenditures for flood control and relief.
 - Regulating all uses within the Flood Regulatory District so as to produce a method of construction and a pattern of development which will minimize the probability of damage to property and loss of life or injury to the inhabitants of the flood hazard areas.
 - Minimizing the need for rescue and relief efforts associated with flooding which are generally undertaken at the expense of the general public.
 - Minimizing prolonged business interruptions.
 - Minimizing damage to public facilities and utilities, such as water and gas mains; electric, telephone and sewer lines; streets and bridges located in areas of special flood hazard.
 - Helping maintain a stable tax base by providing for sound use and development of areas of special flood hazard so as to minimize future flood-blight areas.
 - Participating in the National Flood Insurance Program to assist property owners in obtaining adequate insurance coverage.
- To protect the hydraulic characteristics and storage capacity of the Flood Regulatory District and small watercourses, including the gulches, sloughs and artificial water channels, used for conveying floodwaters so as to promote retention of sufficient floodway area to convey flood flows which can reasonably be expected to occur by:
 - Regulating filling, dumping, dredging and alteration of channels by deepening, widening or relocating, so as to maintain natural storage capacity and slow flow characteristics.
 - Prohibiting unnecessary encroachments.
 - Encouraging uses such as agriculture, open space, recreation, greenbelt, riding trails and parking.

- Preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas.
- Restricting or prohibiting uses which are dangerous to health, safety and property due to water or erosion hazards or which result in damaging increases in erosion or in flood heights or velocities.
- Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction.

(Ord. No. 2001-1215, § 1, 2-26-01)

Other Ordinances

Chapter 26 Zoning and Development - The intent and purpose of the zoning code of the City of Wheat Ridge is to encourage the most appropriate use of land throughout the city to ensure a logical growth of the various physical elements of the city; to lessen congestion in the streets and to facilitate the adequate provision of transportation within and through the city; to secure safety from fire, panic and other dangers; to provide adequate light and air to the residents, structures and properties within the city; to improve housing standards; to conserve property values; to facilitate adequate provision for water, sewage, schools, parks and other public improvements; to protect against poor or inadequate drainage or flood conditions and poor geologic conditions; and in general to promote the health, safety and welfare of the citizens and residents of the City of Wheat Ridge. It is further the intent of this zoning code to preserve the right of citizens to participate in the making of decisions which affect their properties while preserving, to the maximum lawful extent, the legislative and quasi-judicial discretion of the elected representatives of the City of Wheat Ridge.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis. The City has done several floodplain mitigation projects along Lena Gulch and purchased two properties in 2008 and 2009 for a future project. The houses and other improvements were removed from those properties and the properties were added to the nearby open space at Lewis Meadows Park. The City is also exploring funding opportunities for projects along Clear Creek.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

City of Wheat Ridge Open Space Management Plan (2002) – The purpose of the City of Wheat Ridge Open Space Management Plan is to establish a framework for setting priorities and provide specific management direction for natural, scenic, and recreational resources within the Wheat Ridge Greenbelt, Lewis Meadows, and future open space acquisitions. Implementation of the Plan will assist the Wheat Ridge Parks and Recreation Department in its efforts to preserve and enhance these areas for present and future generations. This Plan supplements numerous studies that have been completed through 2001 on Wheat Ridge open space. Relevant information from these municipal and county plans and environmental reports has been reviewed and incorporated into this Plan. The Weed Management and Wildfire Management Plans are integral to the Open Space Management Plan.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities. The City has installed an Emergency Warning System with sirens that are capable of both tone and voice warnings. Most of the floodplain areas of the City are currently covered by the EWS. As of 2015, there are 18 EWS sirens in Wheat Ridge – these are described further in the Wheat Ridge Local Energy Assurance Plan.

City of Wheat Ridge Energy Assurance Plan (2012) - The City of Wheat Ridge Local Energy Assurance Plan (LEAP) is a guide for Wheat Ridge city staff and officials charged with the responsibility of ensuring the continuity of operations and health and safety of the citizens of the City during periods of energy emergencies. The overall goal of the LEAP is to enable Wheat Ridge to be more resilient to energy disruptions as a community.

The Plan is also designed to serve two specific purposes:

1. It serves as an energy disruption mitigation plan by identifying critical city facilities that must be operational during a disruption in order to maintain essential services.
2. It provides an analysis of events that could lead to widespread energy disruptions.

It serves as a supplement to the City of Wheat Ridge Emergency Operations Plan by outlining roles and actions to provide for effective response during energy disruption events.

City of Wheat Ridge Wildfire Management Plan (2003) – As its foundation, the Wildfire Management Plan emphasizes working with adjacent landowners, land managers, and local agencies to reduce the potential effects of wildfire on human life, private property, and the natural resources of Wheat Ridge's Open Space. The Wildfire Management Plan is an integral part of the Wheat Ridge Open Space Management Plan.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff. The City and MHFD have several proposed channelization projects that have been conceptually designed in the Major Drainageway Planning – Phase B Conceptual Preliminary Design Reports that were completed in 2007 and 2008 for Lena Gulch and Clear Creek. The goal of these projects is to reduce the number of properties within the 100-year floodplain. Funding for these projects is being pursued. Previous projects along Lena Gulch have already removed some properties from the 100-year floodplain.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are implemented by a public information team with support from various departments.

The City occasionally hosts an Open House event which is available to all residents. The Community Development Department sponsors several tables with floodplain and stormwater information. Community Development also hosts an annual floodplain meeting with invitations being sent to all properties within the 1% floodplain. The City prepared a floodplain video for its Top of the Hour series on Channel 8 that received a 3rd place award at a national competition.

Public information boards are also included on kiosks at major parks that include emergency information and other public health issues, i.e. animal diseases, wildfire, floods, etc. The City also utilizes its website, Channel 8, a quarterly newsletter, and various social media outlets to broadcast emergency information and public health concerns.

Opportunities for Enhancement

Based on the capability assessment, Wheat Ridge has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Table 2-15 in the Base Plan shows the potential financial benefits from increasing the City's Community Rating System class.

City staff attends and actively participates in tabletop exercises generally related to flooding events with adjacent agencies. Lessons learned from these tabletop events are incorporated into the emergency preparedness plans of the participating departments. A recent tabletop exercise in 2021 highlighted the need to prepare response plans, including evacuation routes and centers, for flooding events along the City's major drainageways.

E.7 Plan Implementation and Maintenance

Wheat Ridge has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the City will continue public participation in the plan maintenance process.

E.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The City of Wheat Ridge recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. The City was involved in the annual updates to the 2016 plan and when possible has implemented the various action in the plan.

E.7.2 Monitoring, Evaluation, and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Wheat Ridge Community Development Department will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. Wheat Ridge Police Department will also be responsible for representing the City on future Jefferson County HMPC meetings, and for coordination with city staff and departments during plan updates. The Community Development and Police Departments and Fire District will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by City Council.

The City of Wheat Ridge will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

E.8 Mitigation Actions

The City of Wheat Ridge has adopted the hazard mitigation goals and objectives developed by the Planning Team and described in Section 6.2 of the Base Plan.

The City had ten mitigation actions in the 2016 Plan, and has completed two of them:

- Maple Grove Dam operations plan
- NFIP/CRS/CIP/Stormwater Utility

The remaining actions have been carried over into the 2021 Plan, along with two new actions.

E.8.1 National Flood Insurance Program

Recognizing the importance of the National Flood Insurance Program (NFIP) in mitigating flood losses, the City of Wheat Ridge will place an emphasis on continued compliance with the NFIP. As an NFIP participant, the City has 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 as well as review of any potential development in special flood hazard areas.

E.8.2 Mitigation Actions

The local planning team identified and prioritized the following mitigation actions for the City of Wheat Ridge based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

H&M: Health & Medical

ENG: Energy

S&S: Safety & Security

FWS: Food, Water, Sheltering

TRN: Transportation

HAZ: Hazardous Waste

Table E-16 City of Wheat Ridge Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Wheat Ridge 1	Clear Creek floodplain mapping and master plan. Revise the floodplain maps for Clear Creek to reflect a 30% reduction in the regulatory flows that was approved by FEMA in Jan 2017. The revised maps will more accurately depict the actual flood risk for properties along Clear Creek resulting in many properties that were added to the floodplain in 2014 being removed.	Flood	2; COM, S&S, TRN	Community Development & MHFD	\$100,000 from Wheat Ridge 2015; IGA with MHFD	High	2024	In Progress. The FHAD will be finalized in 2021 with the PMR process starting soon after.
Wheat Ridge 2	Sloan's Lake floodplain mapping and master plan. Revise the floodplain maps for the Sloan's Lake basin to reflect the updated FHAD that was completed in 2019. The revised maps will more accurately depict the actual flood risk for properties.	Flood	2; S&S, TRN	Community Development & MHFD	\$17,000 from Wheat Ridge; 2016 IGA with MHFD.	Low	2024	In Progress. PMR process starting in 2021.
Wheat Ridge 3	Stormwater CIP - Wadsworth and 35th drainage improvements. As a part of the Wadsworth Widening project, the 1950 storm sewer will be replaced with a larger capacity system that includes a water quality pond before discharging into Clear Creek.	Flood	2; TRN	Community Development & CDOT.	\$8 million from Wheat Ridge, \$63 million widening project. 2015 IGA with CDOT	High	2023	In Progress Construction starting in 2021.
Wheat Ridge 4	Improve Wheat Ridge CRS rating to a Class 4. Wheat Ridge is currently a Class 5 CRS community with residents in the floodplain receiving a 25% discount on their flood insurance premiums. Improving to a Class 4 would result in a 30% savings. The additional program elements in order to raise the rating results in the community being more aware, better prepared, and more resilient from flooding.	Flood	2; S&S	Community Development	Ongoing operation. City General Fund	Medium	Pending completion of new maps.	Not Started. Awaiting new maps for both Clear Creek and Lena Gulch to start preparing a WMP, a Class 4 prerequisite.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Wheat Ridge 5	Floodplain Projects – Clear Creek and Lena Gulch. After the master plans are completed for Clear Creek and Lena Gulch, implement identified projects to reduce flooding and/or maintenance.	Flood	2; COM, S&S, TRN	Community Development & MHFD.	\$1.5 million for Lena Gulch and \$3 million for Clear Creek; City General Fund & MHFD	Medium	Pending completion of new maps	Not Started. Awaiting new maps and masterplans for both Clear Creek and Lena Gulch.
Wheat Ridge 6	Become a Storm Ready Program Community. Participate with Jefferson County in becoming Storm Ready Communities.	Extreme Temps, Hailstorm, Lightning, Severe Winter Storms, Tornado, Windstorm	1,2,3; COM, S&S	Community Development Department	TBD	Low	Unknown	Not Started.
Wheat Ridge 7	Channel 8/Website Updates. Provide general, non-emergency information to help plan, mitigate, and cope with the ongoing nature of hazards.	Avalanche; Cyber; Dam Failure; Drought; Earthquake; Erosion/Deposition; Expansive Soils; Extreme Temps; Flood; Hailstorm; Landslides; Lightning; Pandemic; Winter Storms; Subsidence; Tornado; Wildfire; Windstorm	1; COM, S&S	Administration Services	Minimal; City General Fund	Medium	Ongoing	Annual Implementation
Wheat Ridge 8	Stormwater Program and Maintenance Operations. Manage the federally mandated stormwater program to minimize pollutants entering waterways. Maintain the City's stormwater facilities to reduce the risk of flooding.	Erosion and Deposition	2; COM, ENG, FWS, HAZ, H&M, S&S, TRN	Community Development & Public Works	Ongoing operation; City General Fund	Medium	Ongoing and implemented annually dependent on funding.	Annual Implementation
Wheat Ridge 9	Lena Gulch floodplain mapping and master plan. Revise the floodplain maps for Lena Gulch to reflect updated flows. The revised maps will	Flood	2; COM, ENG, FWS, HAZ, H&M, S&S, TRN	Community Development & MHFD.	\$30,000 from Wheat Ridge; 2021 IGA with MHFD.	High	2024	New in 2021. The FHAD will be finalized in 2022 with the PMR process starting soon after.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	more accurately depict the actual flood risk for properties along Lena Gulch.							
Wheat Ridge 10	Streetscape Conversion to Xeriscape. Replace existing sod based streetscape with native, drought-tolerant xeriscape plan materials. The landscaping that will be installed with the Wadsworth Widening project will serve as a pilot project.	Drought; Extreme Temperatures	2; COM, ENG, FWS, HAZ, H&M, S&S, TRN	Community Development; Parks	Implemented with new projects; City General Fund	Low	Ongoing and implemented annually.	New in 2021. Pilot project with Wadsworth Widening.

DRAFT

Annex F. Town of Morrison

F.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The Town of Morrison fully participated in the 2021 update process as described in Section 3. The Town had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section F.9. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the Town on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

F.2 Community Profile

Figure F-1 shows a map of the Town of Morrison.

F.2.1 History

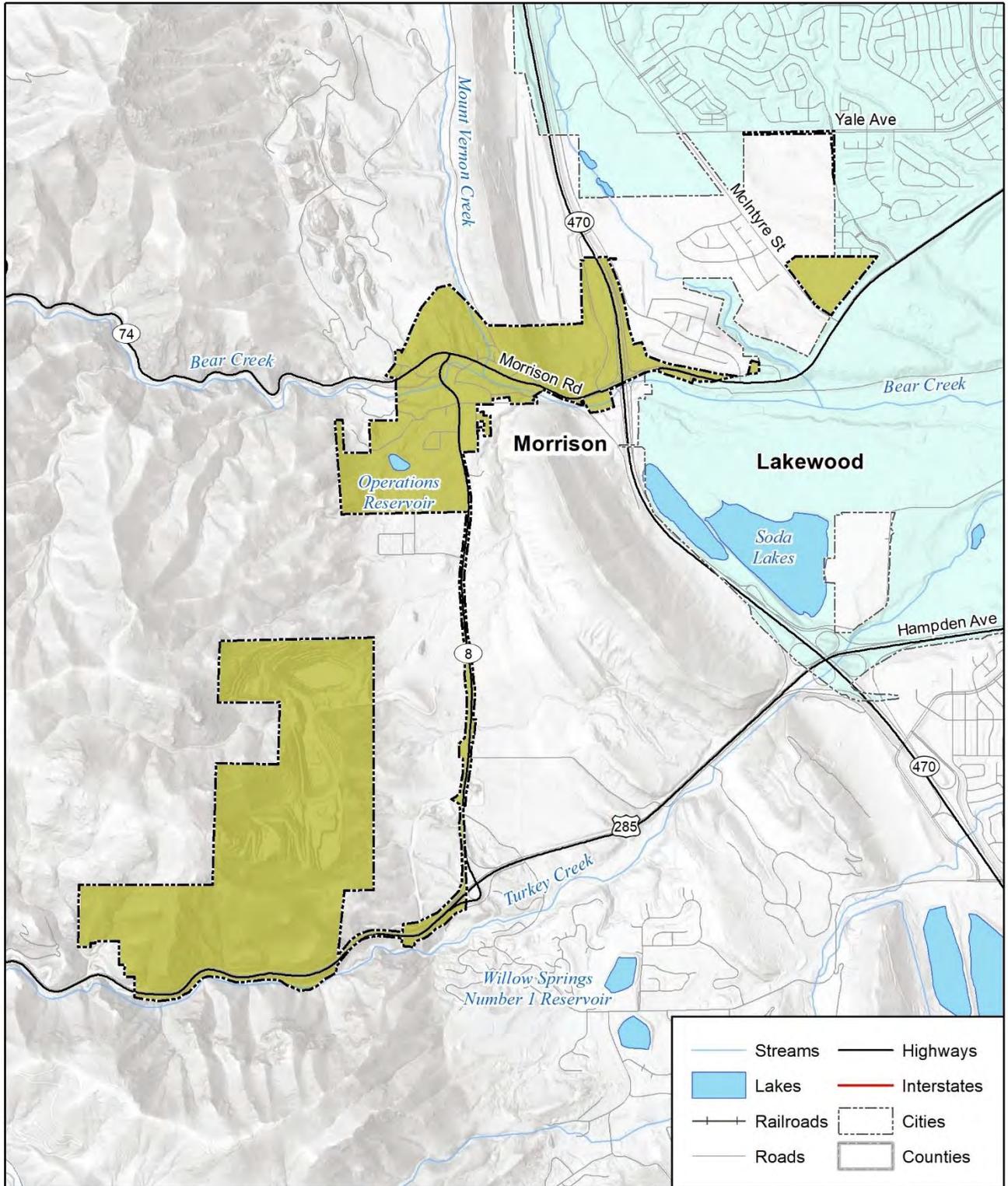
The area around Morrison began to be settled in 1860 and was originally known as Mt. Morrison. The settlement had a population of between two and twenty five people who were mainly located near the confluence of Mount Vernon and Bear Creeks. The area grew quickly after the Civil War and became a center for coal mining, rock quarries, timbering, and other mineral extraction services that were needed to meet the construction and building needs of the growing Denver area. By 1880 the population in and around Morrison had grown to 750.

The physical setting of the town is dominated by two creeks and spectacular land forms associated with hogbacks and sandstone formations which separate Morrison from the Great Plains to the east. In the late 1800s and early 1900s, the close proximity to Denver and the beauty of the area started to attract tourists from Denver. At the time, the Denver South Park and Pacific Railroad later named the Colorado and Southern Railway connected Mt. Morrison to downtown Denver. Transporting visitors to the activities and sights around Morrison, as well as moving freight, coal, stone, lumber, cement, and gypsum back to the burgeoning City of Denver. At its peak in 1913, the Colorado and Southern Railway ran four daily roundtrips to and from Morrison.

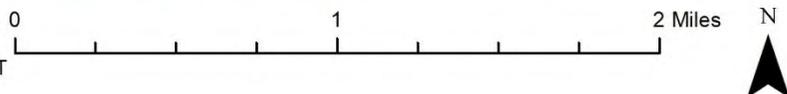
Bear Creek flows through the center of downtown Morrison. It provides water for Denver, Englewood, and Morrison, as well as towns upstream, and has been a primary attraction for residents and visitors alike. It has also been the source of much destruction. A wide bench carved by Bear Creek near the hogback first attracted George Morrison's attention as a potential townsite. The creek also provided a passable route to move people and supplies into the goldfields to the west.

As was common with many of Colorado's early mountain communities, Morrison's population declined sharply at the turn of the 20th Century. Morrison was incorporated in 1906 and by 1910 the Town's population had dropped to 250. As road and highway connections to Morrison were constructed to accommodate automobile and truck traffic, rail services declined and scheduled rail service ended in 1925. Rail services were abandoned following a series of disastrous floods in the 1930s. Morrison's population grew slowly from 1910 to the 1980s when it topped out at just over 500. Morrison is unique in terms of population change since World War II. While most Front Range and foothills communities have mushroomed in growth, the Town's population numbers have declined to approximately 428 (Census 2010), and have remained relatively unchanged for over a quarter of a century.

Figure F-1 Town of Morrison



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT



F.2.2 Population

The U. S. Census Bureau's estimated 2019 population of Morrison was 415. The following tables and graphs summarize key demographic and social characteristics of the Town of Morrison based on the U.S. Census Bureau's American Community Survey, 5-Year Estimates, 2015-2019.

Table F-1 Morrison Demographic and Social Characteristics

Morrison	2015	2019	% Change
Population	394	415	5.33%
Median Age	60.7	63.5	4.6%
Total Housing Units	133	107	-19.5%
Housing Occupancy Rate	94.0%	94.4%	0.4%
% of Housing Units with no Vehicles Available	1.6%	1.0%	-37.5%
Median Home Value	\$385,900	\$541,700	40.4%
Unemployment Rate	4.7%	2.1%	-55.3%
Mean Travel Time to Work (minutes)	31.9	27.9	-12.5%
Median Household Income	\$59,583	\$105,536	77.1%
Per Capita Income	\$33,080	\$40,900	23.6%
% of Individuals Below Poverty Level	9.3%	3.2%	-65.6%
% Without Health Insurance	10.8%	4.0%	-63.0%
# of Households	125	101	-19.2%
Average Household Size	2.0	2.8	38.2%
% of Population Over 25 with High School Diploma or Higher	91.6%	95.2%	3.9%
% of Population Over 25 with Bachelor's Degree or Higher	33.8%	34.0%	0.6%
% with Disability	14.1%	11.2%	-20.6%
% Speak English less than "Very Well"	3.7%	1.7%	-54.1%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table F-2 Morrison Demographic & Social Characteristics Compared to the County & State

Demographic & Social Characteristics (as of 2019)	Morrison	County	Colorado
Median Age	63.5	40.3	36.7
Housing Occupancy Rate	94.4%	96.4%	90.0%
% of Housing Units with no Vehicles Available	1.0%	3.9%	5.1%
Median Home Value	\$541,700	\$397,700	\$343,300
Unemployment	2.1%	3.6%	4.3%
Mean Travel Time to Work (minutes)	27.9	28	25.8
Median Household Income	\$105,536	\$82,986	\$72,331
Per Capita Income	\$40,900	\$44,119	\$38,226
% of Individuals Below Poverty Level	3.2%	7.1%	10.3%
% Without Health Insurance	4.0%	5.5%	7.6%
Average Household Size	2.8	2.40	2.56

Demographic & Social Characteristics (as of 2019)	Morrison	County	Colorado
% of Population Over 25 with High School Diploma or Higher	95.2%	94.5%	91.7%
% of Population Over 25 with bachelor's degree or Higher	34.0%	45.2%	40.9%
% with Disability	11.2%	10.0%	10.6%
% Speak English less than "Very Well"	1.7%	3.0%	5.8%

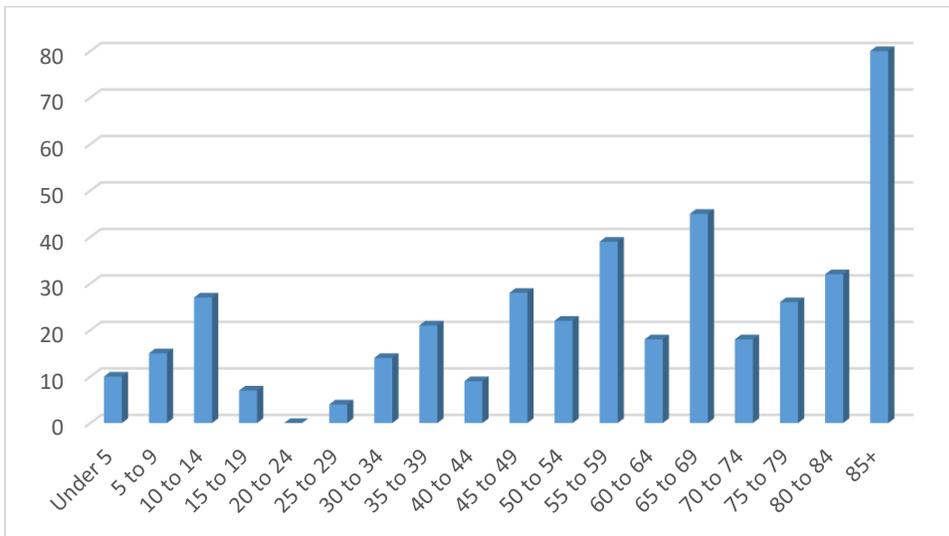
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table F-3 Morrison Demographics by Race and Sex

Morrison	Population	%
Total Population	415	
Male	171	41.2%
Female	244	58.8%
White, not Hispanic	383	92.3%
Hispanic or Latino	20	4.8%
Black	4	1.0%
Asian	5	1.2%
American Indian and Alaska Native	1	0.2%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	0	0.0%
Two or more races	2	0.5%

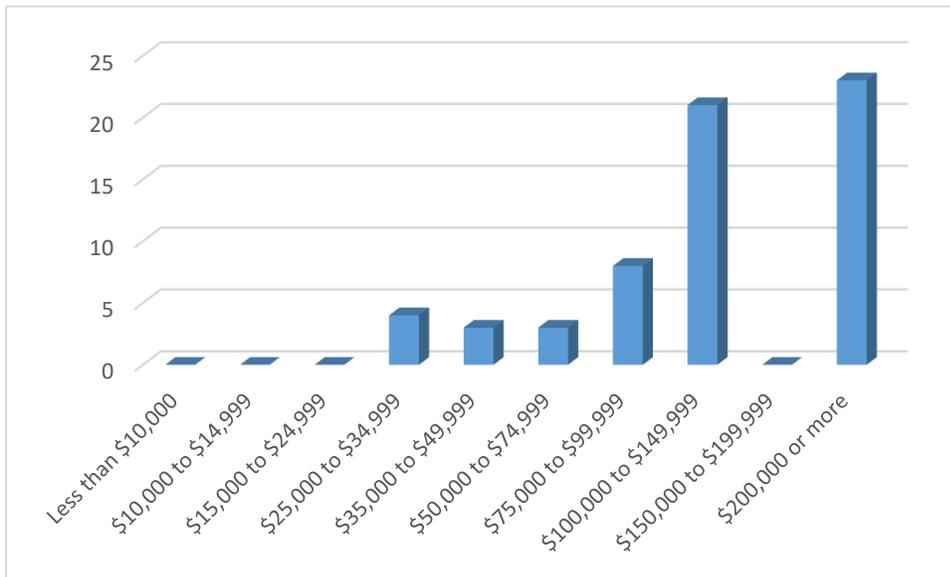
Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Figure F-2 Morrison Population by Age



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Figure F-3 Morrison Income Distribution



Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

F.2.3 Social Vulnerability

Social vulnerability scores for the Town of Morrison can be seen in Figures 2-2 through 2-6 in Section 2 of the Base Plan. The Town of Morrison’s overall social vulnerability is lower than the County as a whole, although it ranks above average in housing and transportation vulnerability. However, the Town ranks below average for household composition and disability vulnerability. As shown in Figure F-2 above, Morrison has a relatively large percentage of older residents, who often need additional help following a disaster. Resources and measures to reduce the social determinants of disasters may be most effectively allocated to these areas. Moreover, it is critical that the Town analyze the individual social vulnerability indicators that make those parts of the community stand out. Through ongoing evaluation, the Town of Morrison will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

F.2.4 Growth and Development Trends

Table F-4 shows the various types and amounts of housing units in the Town of Morrison based on data from the American Community Survey Five Year Estimates for 2015-2019. As shown in the table, most housing units (83.2%) are single family homes (1-unit detached) in Morrison.

Table F-4 Town of Morrison Types and Total Housing Units

Type of Housing Units	Total	%
Total housing units	107	
1-unit detached	89	83.2%
1-unit attached	0	0.0%
2 units	2	1.9%
3 or 4 units	15	14.0%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	1	0.9%
Mobile home	0	0.0%
Boat, RV, van, etc.	0	0.0%

Source: U.S. Census Bureau, American Community Survey, 5-Year Estimates 2015-2019

Table F-5 illustrates how Morrison’s population and number of housing units have declined slightly between 2000 and 2019. Over the last half century, Morrison’s population has remained relatively static, and community feedback received to date supports maintaining the existing small population.

Table F-5 Morrison’s Change in Population and Housing Units, 2010-2019

2000 Population	2019 Population	Percent Change 2010-2019	2010 # of Housing Units	2019 # of Housing Units	Percent Change 2010-2019
430	415	-3.5%	136	107	-2.1%

Source: American Fact Finder, www.census.gov

F.2.5 Natural, Cultural, and Historic Resources

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

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

Natural Resources

Natural resources of importance around the area of Morrison include nearby open space, Red Rocks Park and the Bear Creek corridor. For information about natural resources in Jefferson County, which includes Morrison see Section 4.2.3 of the Base Plan.

Historic and Cultural Resources

Table F-6 lists the 12 properties in Morrison that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties; for more information about these registers, see Section 4.2.3 of the Base Plan.

Table F-6 Morrison’s Historic Properties/Districts in National and State Registers

Property Name	Register	Listed Date
Bear Creek Canyon Scenic Mountain Drive	National	11/15/1990
Bradford House III Archeological Site	National	4/8/1980
Bradford, Robert Boyles, Property	National	2/2/2015
Craig, Katherine, Park	National	6/30/1995
Dinosaur Ridge	State	3/10/1993
District No. 17 – Medlen School	State	4/14/2015
District No. 17 School--Medlen School	National	4/14/2015
Fort, The	National	7/14/2006
LoDaisKa Site	National	9/25/2003
Morrison Historic District	National	9/28/1976
Morrison Schoolhouse	National	9/4/1974
Red Rocks Park District	National	5/18/1990

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/cty/jf.htm; National Register Information System, www.nr.nps.gov/

It should be noted that the Morrison Historic District incorporates many historic properties. Seventy buildings and sites were listed as part of the District, which encompasses the downtown area and some buildings on the neighboring streets. Some of these structure date to the founding of the town in 1872.

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. There are currently no Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) buildings in the Town of Morrison, although there are 19 in the Morrison vicinity.

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.

F.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the Town of Morrison using the same methodology as in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Table F-7 lists the significance of each hazard for the Town of Morrison based on the updated risk assessment and planning team input. The highest risk hazards were determined to be flood and severe winter storm.

Table F-7 Town of Morrison – Hazards Summary

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance
Avalanche	Unlikely	Limited	Negligible	Low
Cyber Attack	Limited	Occasional	Negligible	Low
Dam Failure	Unlikely	Limited	Limited	Medium
Drought	Likely	Extensive	Negligible	Low
Earthquake	Unlikely	Extensive	Negligible	Medium
Erosion and Deposition	Occasional	Limited	Negligible	Low
Expansive Soils	Unknown	Limited	Negligible	Low
Extreme Temperatures	Unlikely	Extensive	Negligible	Low
Flood	Likely	Significant	Catastrophic	High
Hailstorm	Likely	Extensive	Negligible	Medium
Landslide, Debris flow, Rockfall	Likely	Limited	Negligible	Low
Lightning	Likely	Limited	Negligible	Medium
Pandemic	Extensive	Unlikely	Catastrophic	High
Severe Winter Storms	Likely	Extensive	Negligible	High
Subsidence	Unlikely	Limited	Negligible	Low
Tornado	Occasional	Extensive	Limited	Low
Wildfire	Likely	Significant	Negligible	Medium
Windstorm	Likely	Extensive	Limited	Low to Medium
<p>Geographic Extent</p> <p><u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences</p> <p><u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences</p> <p><u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences</p> <p><u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Severity/Magnitude</p> <p><u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.</p> <p><u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.</p> <p><u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.</p> <p><u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences</p> <p><u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.</p> <p><u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.</p> <p><u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years</p> <p><u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance</p> <p><u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. Also used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.</p> <p><u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. Also used for hazards with a high impact rating but an extremely low frequency.</p> <p><u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. Also used for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		

F.4 Community Asset Inventory

Table F-8 shows the total number of improved parcels, properties, and their improvement and content values for the Town of Morrison. See Section 4.2 of the Base Plan for details and methodology.

Table F-8 Morrison’s Property Inventory

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Commercial	20	36	\$6,526,206	\$6,526,206	\$13,052,412
Exempt	6	6	\$9,920,151	\$9,920,151	\$19,840,302
Industrial	2	2	\$482,576	\$482,576	\$965,152
Mixed Use	8	9	\$2,197,352	\$2,197,352	\$4,394,704
Residential	119	135	\$46,271,710	\$23,135,855	\$69,407,565
Total	155	188	\$65,397,995	\$42,262,140	\$107,660,135

Source: Jefferson County Assessor’s Office

Table F-9 is a detailed inventory of assets identified by the Town’s planning team. This inventory includes critical facilities. For more information about how “critical facility” is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table F-9 Morrison’s Assets

Name of Asset	Replacement Value (\$)	Hazard Specific Info
Historic Business District	Unknown	Loss of sales tax/employment
Town Shops/Equipment	\$200,000	Recovery activity – flood
Wastewater Treatment Plant	\$5-7 Million	Downstream impacts
Police Garage		
Morrison Natural History Museum		
3 Town buildings	\$200,000	Flood damage
Town Hall/Courthouse	\$900,000	Court activities/Large meeting area
Town Water Diversion Structure (Bear Creek)	\$200,000	Drinking Water Supply
Water Treatment Plant	\$1,930,000	Drinking Water Supply

Many of the facilities listed above are also in GIS databases provided by the Town of Morrison and Jefferson County. Critical facility counts and types are shown in Table F-10 and in the map in Figure F-3. Shelters may be in facilities such as schools or recreation centers and are not indicated on the map. Bridges are also not indicated on the map.

Table F-10 Summary of Morrison’s Critical Facilities in GIS

FEMA Lifeline	Count
Communications	8
Energy	0
Hazardous Materials	3
Health and Medical	1
Safety and Security	2
Transportation	8
Total	22

Source: Jefferson County Assessor (October 2015) HSIP Freedom 2015 and HAZUS 2.2

F.5 Vulnerability Assessment

This section details vulnerability to specific hazards, where quantifiable, and where it differs from that of the overall County. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas. For a discussion of the methodology used to develop the loss estimates refer to Section 4.3 of the Base Plan.

F.5.1 Dam Failure/Incidents

Past Events

Based on a search of the National Performance of Dams database there have been thirteen incidents in Jefferson County since 1952, but none of those incidents directly impacted the Town of Morrison.

Dams of Concern

Table 4-11 in Section 4.3.3 of the Base Plan lists dams of concern for Jefferson County. Dams upstream of the Town of Morrison are shown in Table F-11.

Morrison has two high hazard dams whose failure could impact life and/or property. Note: Hazard class does not indicate dam condition, it merely indicates risks in case of failure. A high hazard dam poses risk to both life and property, a significant hazard dam only poses a risk to property. See discussion the Section 4 of the Base Plan. Both dams have been given a satisfactory rating by the State Engineer.

Table F-11 Dams of Concern to Town of Morrison

Dam Name	Stream	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Bergen East	Weaver Gulch	706	Yes	High
Morrison Raw Water	Bear Creek	29	Yes	High

Source: National Inventory of Dams, NHD

Non-Failure Dam Incidents

As discussed in Section 4.3.3 of the Base Plan, the Colorado Department of Natural Resources, Dam Safety Division, has a statewide database that identifies the potential for non-failure dam inundation to show potential areas of flooding where outlet capacity exceeds the downstream channel capacity. The dams at the highest risk of non-failure inundation are shown in Table 4-14 of the Base Plan. The ranking shown in the table represents the likelihood of hazardous conditions existing below the dams during a worst case, maximum outlet release scenario. Dams are ranked as high, moderate, or low likelihood for outlet releases to cause conditions that could require an emergency response to reduce potential downstream consequences. The ranking is based on a statewide database of high hazard dams that includes 441 high hazard dams that have been analyzed by the Colorado DNR for this aspect of dam incident flooding. The high, moderate, or low designations were assigned by DNR by dividing the total number of ranked dams across the state into thirds. Should there be a need to relieve pressure on the dam (e.g., if there was excess inflow from high rains or snowmelt) releases from the dams ranked as high

or moderate may result in downstream flooding. The Bergen East Dam referenced above has been identified as also having risk of non-failure inundation.

Table F-12 Dams with Risk of Non-Failure Inundation

Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
090104	Bergen East	12" CIP	45	157	Moderate

Source: State of Colorado Department of Natural Resources, Dam Safety Division

No low head dams have been identified in the Town of Morrison.

Estimating Potential Losses

Table F-13 shows that Morrison has 6 parcels (3.8% of total) that are potentially exposed with a total value of \$2.9 Million. Of the parcels exposed, 5 are residential properties potentially exposing 10 residents to dam inundation hazards.

Table F-13 Dam Inundation Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	1	1	\$211,534	\$211,534	\$423,068	
Residential	5	5	\$1,639,997	\$819,999	\$2,459,996	10
Total	6	6	\$1,851,531	\$1,031,533	\$2,883,064	10

Source: Jefferson County Assessor, National Inventory of Dams, NHD

Critical Facilities

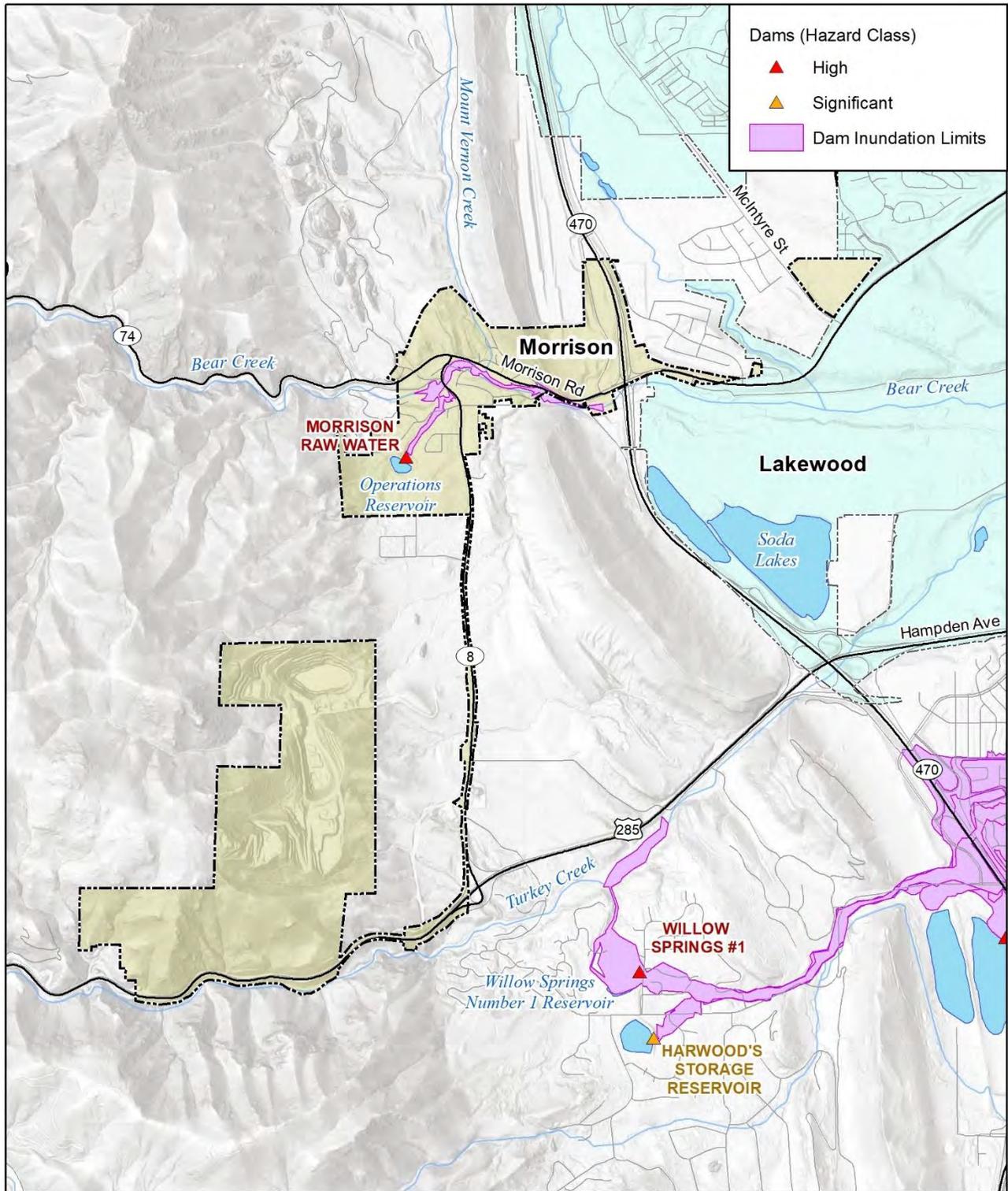
There are 4 critical facilities identified in areas at risk of dam inundation in the Town of Morrison, shown in Table F-14.

Table F-14 Critical Facilities Potentially at Risk of Dam Inundation, by FEMA Lifeline

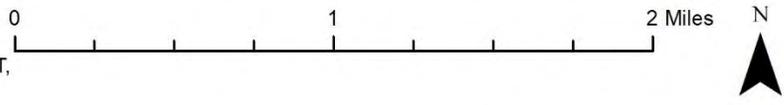
FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
Transportation	Bridge	3
Total		4

Source: National Inventory of Dams, HIFLD and CERC

Figure F-4 Dam Inundation Areas in the Town of Morrison



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado DWR Dam Safety



F.5.2 Flood

Past Events

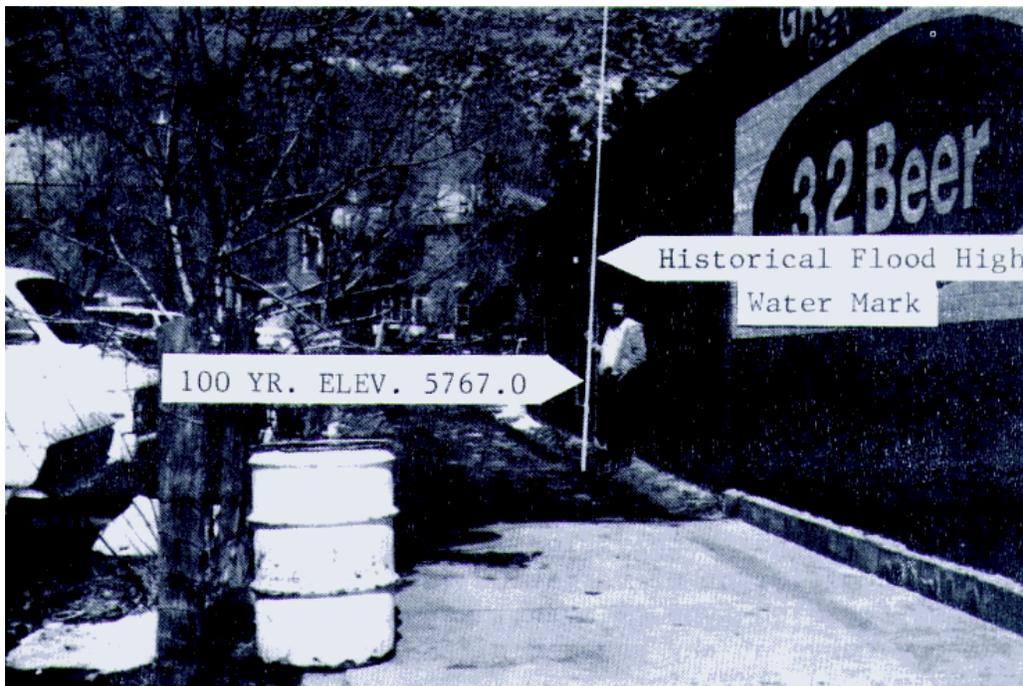
1896 Flooding

A cloudburst in Bear Creek Canyon brought a solid wall of water through the Town of Morrison. The flood was 200 feet wide and 15 feet deep. It caused over \$6 million in damages (1999 dollars). 27 people lost their lives. Most of those who lost their lives were Denverites camping in the canyon. All bridges across Bear Creek were washed away, trees were uprooted, and long stretches of railroad track were washed out. This flood was one of the deadliest floods in Colorado history.

Multiple Floods - 20th Century

There have been multiple major floods during the 20th century on both the Bear and Mount Vernon Creek. These floods have caused extensive damage to property and infrastructure. Roads and bridges were damaged. Significant losses were suffered by local residents and businesses. Multiple deaths and injuries were reported. The Town has been subject to severe and repetitive floods. See the flood hazard profile in the Base Plan for descriptions of these events. Figure F-5 depicts Bear Creek flood levels on the wall of a store in Morrison between Market Street and Mount Vernon Street downstream of the Mount Vernon Creek confluence with Bear Creek. The “Historic High Water Mark” depicts the level of the September 2, 1938 flood that peaked around 7 p.m.

Figure F-5 1938 Flood High Water Mark between Market Street and Mount Vernon Street



2013 Storms and Flooding

From September 9 - 15, 2013, very heavy rains created massive flooding along Bear Creek and Mt. Vernon Creek through Morrison. Bear Creek peaked at a flow of about 3,200 cfs in Morrison as reported by the Division of Water Resources, which is likely a 10 to 15-year storm event. The Bear Creek at Morrison gaging station recorded a 3' rise in water surface. Upstream of Highway 8 near Morrison Park, the Bear Creek flooding caused damages to the channel banks and trail. Downstream of the Highway 8 crossing, an existing sewer main below the Canon Street bridge was threatened and the Ward Ditch diversion dam and adjacent concrete bike path were undermined. The State Engineers' Office was concerned that the Evergreen dam located upstream of Morrison would exceed its capacity. As a result, for several days Morrison was under an evacuation alert status.

Estimating Potential Losses

Figure F-6 depicts the FEMA flood zones (1% annual chance and 0.2% annual chance) as well as all the at-risk properties in Morrison.

Table F-15 shows the parcels and buildings values at risk to the 1% annual chance flood. For this analysis, content values were estimated based on prevailing land use and a multiplier was applied to building and content values to estimate losses to each. See Section 4 Hazard Profiles for details on methodology. According to the analysis, 60 buildings (21 of which are residential) are at risk, totaling \$5.2 million of damage to buildings and contents. This represents 32% of the buildings in the Town. Note that this analysis does not account for properties which may have been built in accordance with local floodplain regulations and mitigated to the 1% annual chance flood.

Table F-15 Town of Morrison Properties At-Risk to 1% Annual Chance Flood

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss (25%)	Population
Commercial	18	31	\$5,632,583	\$5,632,583	\$11,265,166	\$2,816,292	
Mixed Use	7	8	\$2,167,342	\$2,167,342	\$4,334,684	\$1,083,671	
Residential	12	21	\$3,457,540	\$1,728,770	\$5,186,310	\$1,296,578	43
Total	37	60	\$11,257,465	\$9,528,695	\$20,786,160	\$5,196,540	43

Source: Wood analysis of Jefferson County Assessor's Data

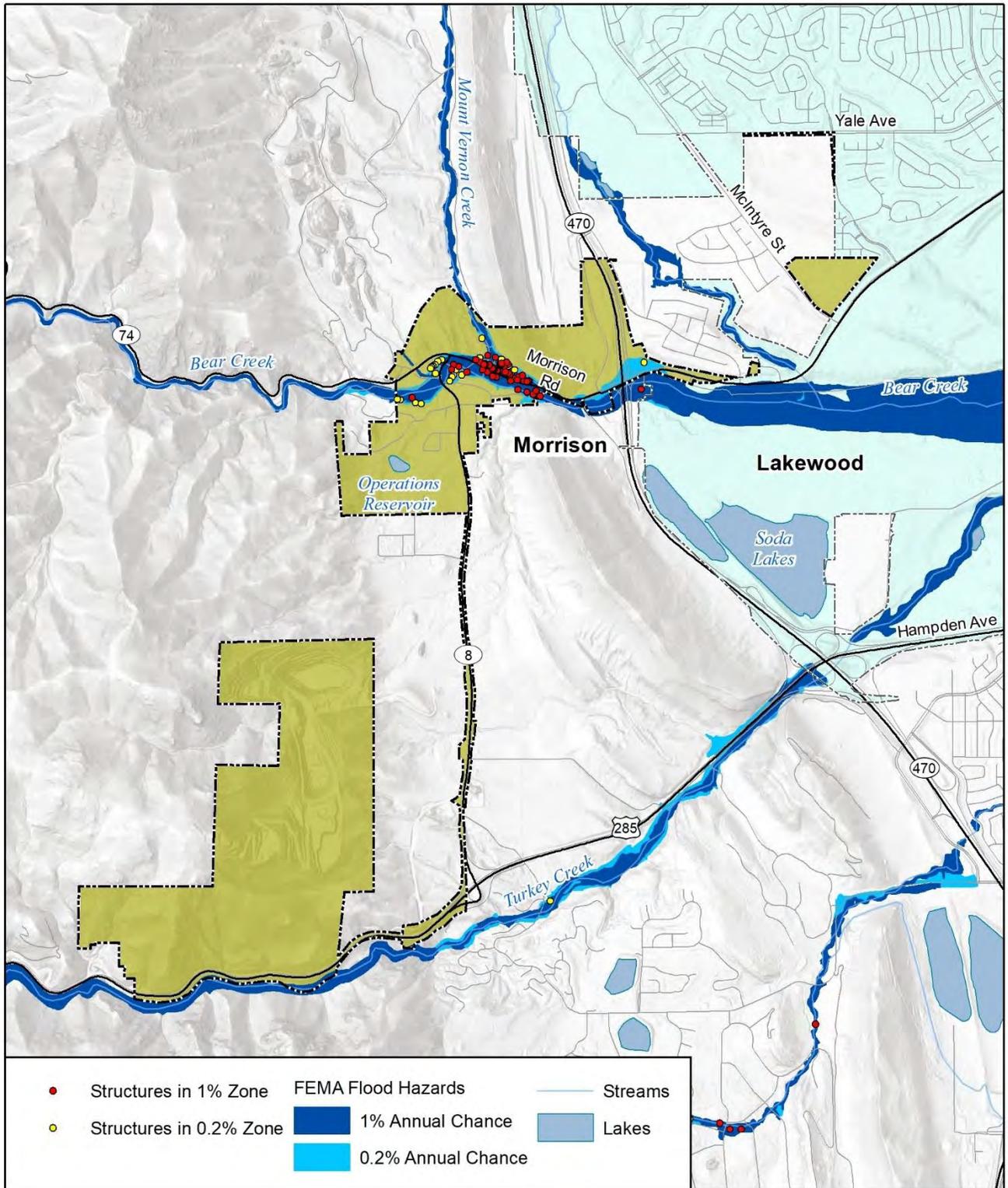
Table F-16 shows the parcels and buildings at risk to the 0.2% annual chance flood. According to the analysis, 25 buildings (19 of which are residential) are at risk, totaling \$2.1 million of damage to buildings and contents over and above the 1% scenario.

Table F-16 Town of Morrison Buildings At-Risk to 0.2% Annual Chance Flood

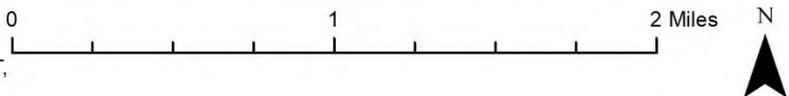
Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Estimated Loss (25%)	Population
Commercial	1	3	\$467,746	\$467,746	\$935,492	\$233,873	
Exempt	2	2	\$139,723	\$139,723	\$279,446	\$69,862	
Mixed Use	1	1	\$30,010	\$30,010	\$60,020	\$15,005	
Residential	17	19	\$4,776,486	\$2,388,243	\$7,164,729	\$1,791,182	39
Total	21	25	\$5,413,965	\$3,025,722	\$8,439,687	\$2,109,922	39

Source: Wood analysis with Jefferson County Assessor's Data

Figure F-6 Town of Morrison Flood Hazard and At-Risk Properties



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
FEMA NFHL 1/15/2021



Critical Facilities

There are six critical facilities in the 1% annual chance flood zone (Table F-17), with an additional three additional critical facilities in the 0.2% annual chance flood zone (Table F-18). Together this represents 40% of the Town’s critical facilities.

Table F-17 Morrison Critical Facilities in 1% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	3
Transportation	Bridge	3
Total		6

Source: HIFLD and CERC

Table F-18 Morrison Critical Facilities in 0.2% Annual Chance Floodplain

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
Transportation	Bridge	2
Total		3

Source: HIFLD and CERC

The Town of Morrison has participated in the National Flood Insurance Program (NFIP) since 1982. NFIP insurance data shows that as of January 2021 there are 8 flood insurance policies in force in the Town providing \$2.7 million of coverage. There have been 8 historical claims for flood losses, totaling \$1,231. There are no repetitive loss structures or severe repetitive loss structures as defined by the NFIP. In addition to participating in the NFIP, Arvada is also a Community Rating System (CRS) participant and currently a Class 8 CRS community.

F.5.3 Geologic Hazards

Morrison has some limited exposure to geologic hazards including slope failure, dipping bedrock and slope failure. These hazard areas mainly affect the eastern portions of the Town. See the maps in Figure F-7 and Figure F-8. Specific structures at risk from specific geologic hazards are detailed in Table F-19 and Table F-20. Methodology for this table can be found in Section 4.3.4 Estimating Potential Losses.

Table F-19 Town of Morrison Slope Failure Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Exempt	1	1	\$25,264	\$25,264	\$50,528
Mixed Use	3	3	\$519,540	\$519,540	\$1,039,080
Residential	4	4	\$724,480	\$362,240	\$1,086,720
Total	8	8	\$1,269,284	\$907,044	\$2,176,328

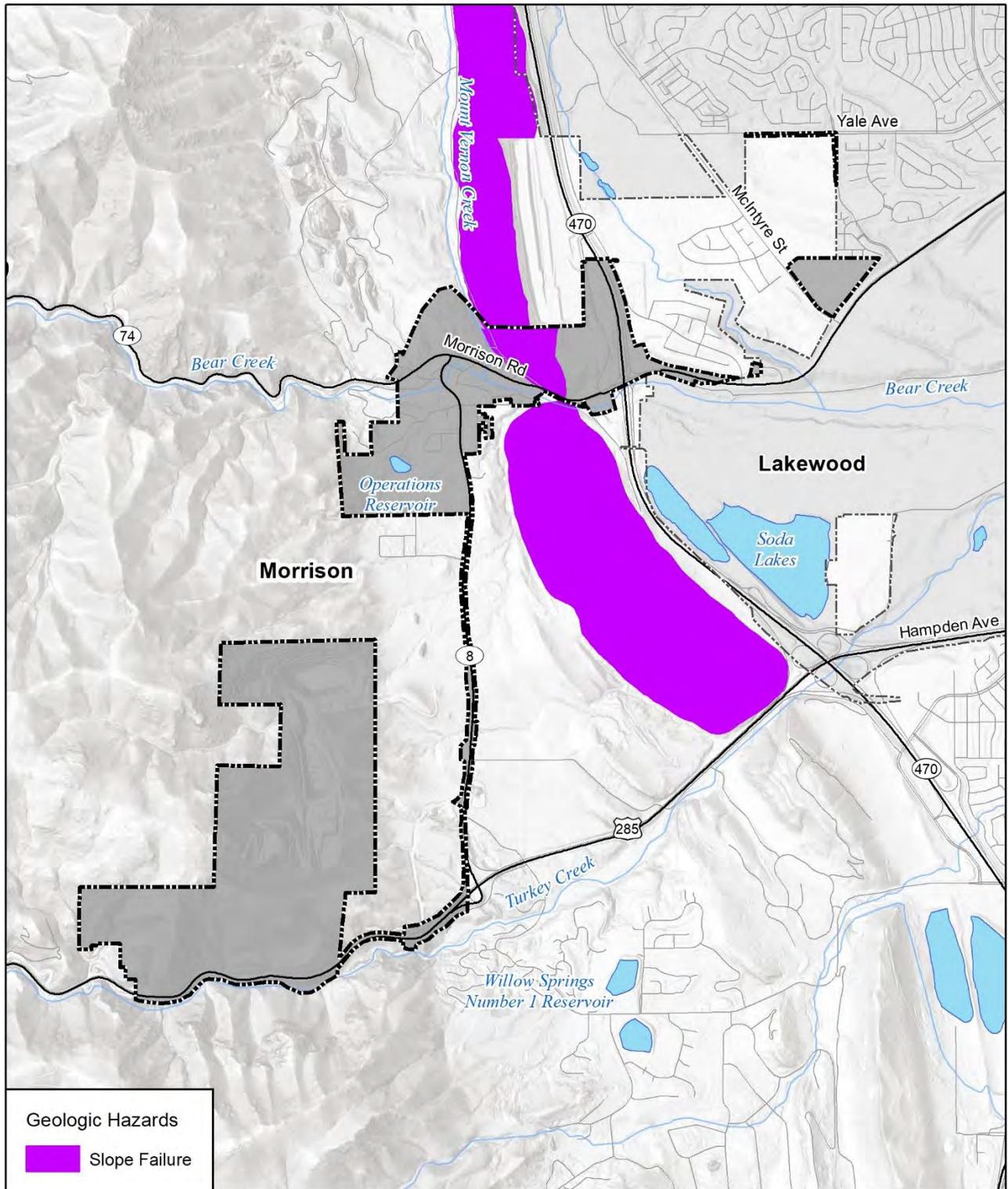
Source: Wood analysis of Jefferson County Assessor’s Data

Table F-20 Town of Morrison Dipping Bedrock Risk

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value
Commercial	1	1	\$840,839	\$840,839	\$1,681,678
Exempt	3	3	\$8,979,349	\$8,979,349	\$17,958,698
Industrial	1	1	\$72,577	\$108,866	\$181,443
Total	5	5	\$9,892,765	\$9,929,054	\$19,821,819

Source: Wood analysis of Jefferson County Assessor’s Data

Figure F-7 Town of Morrison Landslide & Rockfall Risk Map



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

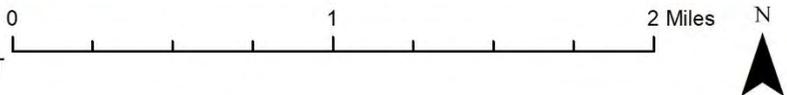
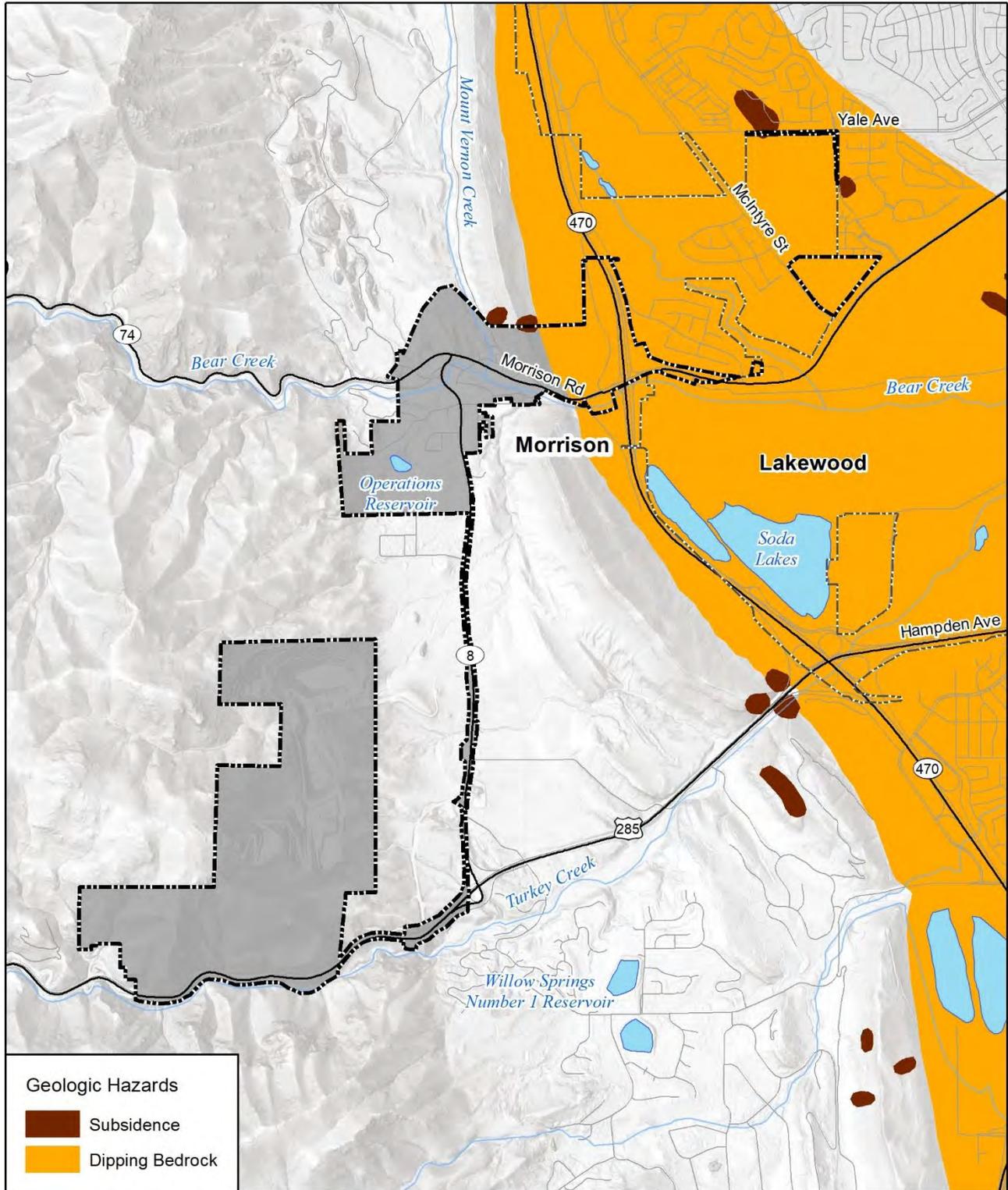


Figure F-8 Town of Morrison Areas at Risk of Subsidence and Dipping Bedrock



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles



According to a Geological Society of America report the town’s raw water pipeline was affected by a landslide in the past; the point of damage was mitigated, but additional mitigation is needed.

Morrison’s proximity to the Golden Fault as a potential, though unlikely, earthquake source makes it vulnerable to earthquake damage. Morrison’s downtown historic district has a number of un-reinforced masonry buildings that are particularly vulnerable to earthquake shaking.

F.5.4 Wildfire

Estimating Potential Losses

Parcel analysis was conducted using GIS to analyze where parcels, buildings counts, property types and content values intersected with the wildfire hazards zones defined by the Colorado Forest Atlas, from highest to lowest risk. In addition to parcel data, an address point layer was also used to estimate building locations. Results are shown in Table F-21 - Table F-23. Based on this analysis Golden has 112 structures at risk of wildfire, 82 of which are at moderate risk. Residential property types have the greatest number of parcels at risk of wildfire, in addition there are 208 residents exposed to wildfire risk.

Table F-21 Moderate Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	5	5	\$14,962,510	\$14,962,510	\$29,925,020	
Exempt	1	2	\$18,084,856	\$18,084,856	\$36,169,712	
Industrial	6	6	\$604,500	\$906,750	\$1,511,250	
Mixed Use	1	1	\$779,340	\$779,340	\$1,558,680	
Residential	68	68	\$36,620,694	\$18,310,347	\$54,931,041	152
Total	81	82	\$71,051,900	\$53,043,803	\$124,095,703	152

Source: Colorado Forest Atlas & Jefferson County Assessor’s Office data

Table F-22 Low Wildfire Risk, By Property Type

Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Residential	2	2	\$179,353	\$89,677	\$269,030	4
Total	2	2	\$179,353	\$89,677	\$269,030	4

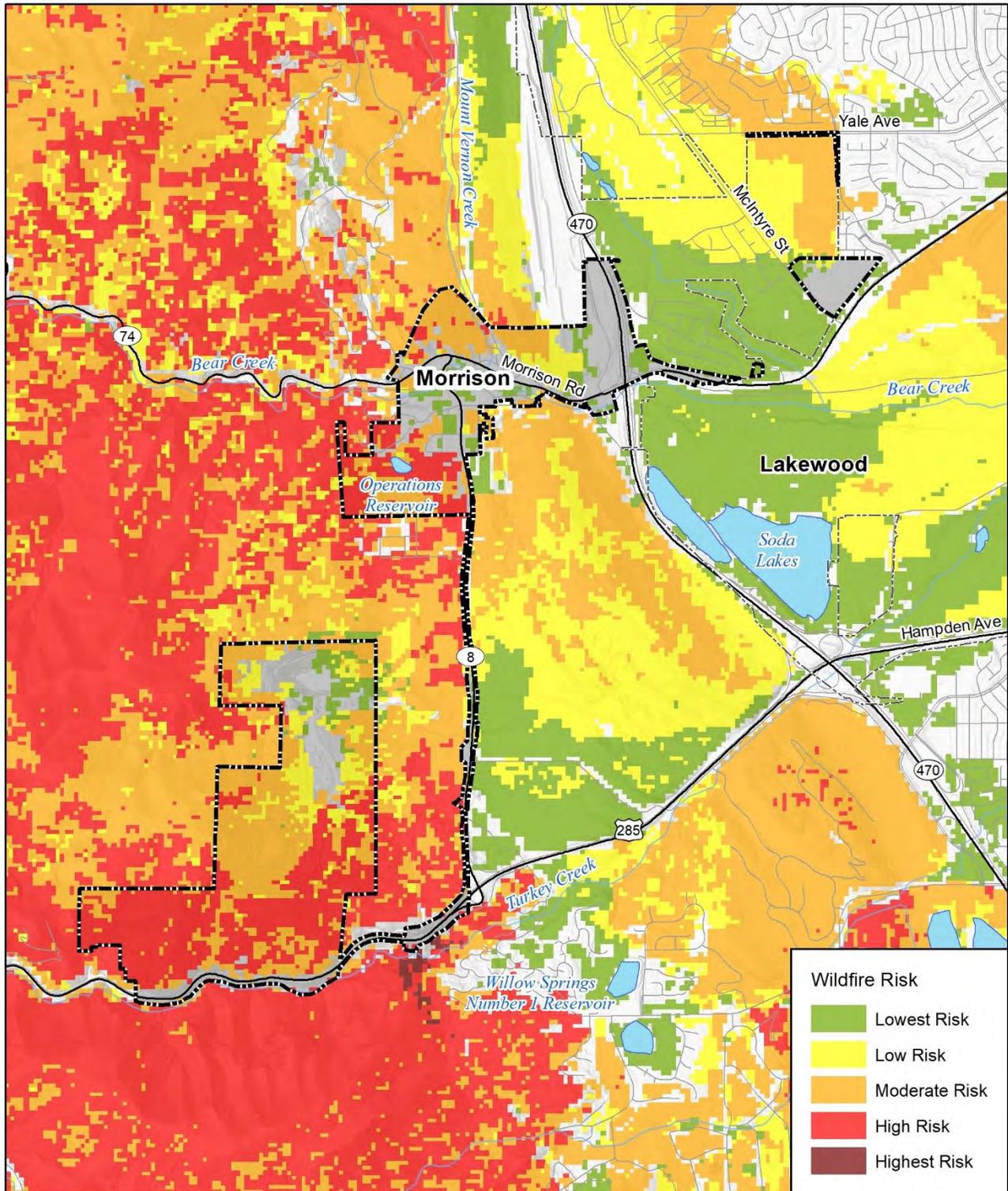
Source: Colorado Forest Atlas & Jefferson County Assessor’s Office data

Table F-23 Lowest Wildfire Risk, By Property Type

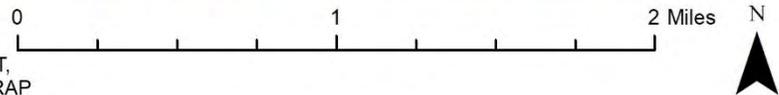
Property Type	Improved Parcels	Buildings	Improved Value	Content Value	Total Value	Population
Commercial	1	1	\$211,534	\$211,534	\$423,068	
Exempt	2	2	\$863,450	\$863,450	\$1,726,900	
Residential	25	25	\$9,211,055	\$4,605,528	\$13,816,583	52
Total	28	28	\$10,286,039	\$5,680,512	\$15,966,551	52

Source: Colorado Forest Atlas & Jefferson County Assessor’s Office data

Figure F-9 Town of Morrison Wildfire Hazard Map



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT,
Colorado State Forest Service COWRAP



Critical Facilities

The Town of Morrison has a total of 2 critical facilities at low risk to wildfire. The following table shows the results of the GIS analysis and is organized by wildfire risk and Lifeline. Refer to section 4.3.16 of the Base Plan for more information on the methodology of the GIS analysis.

Table F-24 Town of Morrison Critical Facilities At-Risk to Wildfire by Type

Wildfire Risk	FEMA Lifeline	Critical Facility Type	Count
Low	Communications	Land Mobile Private Towers	1
	Transportation	Bridge	1
Total			2

Source: HIFLD and CERC

F.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, lightning, tornado, and windstorm the entire building inventory and population in the Town is potentially exposed. That is the reason for the asset inventory provided in Section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory. Morrison’s location at the base of the foothills makes it more prone to high wind events than other communities in this plan.

Past Events

1913 Winter Storm Blizzard – A severe snow event in the winter of 1913 caused a complete shutdown of the town as well as Turkey and Bear Creek Canyons. Food items and mail had to be delivered to residents by pack mule and horseback while medical supplies, food and other critical items were brought in by rail and then relayed up the canyons by private contractors.

2006 Winter Storm Blizzard – A slow moving low pressure system moved from the Desert Southwest and into Southeastern Colorado. As a result, a deep upslope flow developed along the Front Range and Northeast Plains of Colorado. Strong winds and heavy snow brought blizzard conditions to the Interstate 25 Corridor, from the Wyoming state line south to Colorado Springs. Storm totals generally ranged from 2 to 4 feet in and near the Front Range Foothills and Palmer Divide. Schools in Morrison were closed, and businesses in the town suspended their business to dig out from the storm, causing a loss of business and sales tax revenue. The Town of Morrison was given aid in the amount of \$8,000 to offset snow removal costs.

F.6 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. Morrison’s regulatory, administrative, and technical, and fiscal mitigation capabilities are summarized in Section 2.7 of the Base Plan. Additional details on specific capabilities are discussed below.

National Flood Insurance Program

The Town of Morrison joined the National Flood Insurance Program (NFIP) on December 1, 1982. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. Morrison’s initial Flood Insurance Rate Map became effective on 5/15/85. The most current Digital Flood Insurance Rate Maps were updated and became effective on 2/5/2014. As of January 2021, there were 8 NFIP policies in force in Golden, with a total coverage \$2,756,300; this represents a decrease of 4 policies and \$166,300 in coverage since 2015. In Golden, there have been 8 historical claims for flood losses totaling \$1,231. At the time this plan was developed there were no repetitive or severe repetitive loss structures as defined by the NFIP.

The Town also joined the Community Rating System (CRS) on October 1, 1996. The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in

communities that provide extra measures of flood above the minimum NFIP requirements. As of January 2021, Morrison had a CRS class rating of 8 (one a scale of 1-10, 1 being the best). This rating has improved from a class 9 in 2015, and provides a 5 percent discount for policyholders within a special flood hazard area (SFHA) and a 5 percent discount for those outside of an SFHA.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Morrison activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

Town of Morrison Comprehensive Plan (2015)

The Town's comprehensive plan is a guide to help the Town make decisions and establish its future direction. The goals and policies contained within the plan cover a broad range of subject matter related to services, issues, and geographic areas within Morrison. Combined, these elements serve to direct future policy decisions to preserve vital community attributes and service levels and manage growth.

The following excerpts are goals and related polices that are relevant to this hazard mitigation plan.

- **Goal SA-1:** Preserve significant natural, cultural, and agricultural resources within the planning area and maintain the rural character of Morrison.
 - **Policy SA-1:** Identify and encourage the preservation and enhancement of agricultural lands, scenic view corridors, wildlife habitat, and geologic rock formations.
- **Goal A-1:** Grow with the intention of maintaining Morrison's small town atmosphere.
 - **Policy A2:** Adequate public facilities and services should be available to serve current and future residents in a cost-effective, efficient manner. Development should occur where it can be served by Town infrastructure.
- **Goal D-1:** Create and plan for the future public recreational opportunities for both residents and day visitors to improve tourism and support existing retail businesses.
 - **Policy D-3:** Parks, trails, and open space shall be designed and constructed concurrently with new development. In addition, new parks and trails shall be multi-purpose and enhance the area's quality of life and small town character.
- **Goal D-2:** Preserve, protect, and enhance significant open spaces, natural and wildlife habitat.
 - **Policy D-4:** Protect and enhance significant wildlife habitat, vegetation communities, geologic features, viewsheds, agricultural land, and natural areas.
- **GOAL 1:** Complete the Town reservoir and water treatment improvements in order to take full advantage of the Town's current water rights.
 - **Policy I-1:** Develop a water system capable of providing an adequate year-round water supply in dry years and for future residential and commercial growth by creating storage and treatment facilities.
 - **Policy I-3:** Assure that businesses comply with regulations governing water and wastewater usage as well as solid waste storage and disposal.
- **Goal J-1:** Promote the conservation of natural resources and the efficient use of energy while encouraging sustainable development practices.
 - **Policy J-7:** Create and adopt natural hazard regulations in order to guide development.

- **GOAL 1:** Continue to ensure adequate flood, police, fire, and emergency protection for Morrison residents and property by collaborating with other agencies during major events and relocating some Town facilities out of the floodplain.
 - **Policy K-1:** Continue to expand the positive working relationship with Denver's Theatres and Arenas, Bandimere Speedway, the Jefferson County Sheriff's Office, the Colorado State Patrol, the West Metro Fire Protection District, and other entities associated with public safety and emergency response in the area.
 - **Policy K-2:** Continue to participate in the federal flood insurance program and work to maintain and improve its working relationship with the Urban Drainage and Flood Control District.

Municipal Code

Title 10, Chapter 3: Floodplain Damage Prevention (Ord. 407, 1-7-2014)

10-3-1 Statutory Authorization

The legislature of the state of Colorado has, in title 29, article 20 of the Colorado Revised Statutes, delegated the responsibility of local governmental units to adopt regulations designed to minimize flood losses. Therefore, the Board of Trustees of the Town of Morrison, Colorado, does hereby adopt the following floodplain management regulations.

10-3-3 Statement of Purpose

It is the purpose of this chapter to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

- To protect human life and health.
- To minimize expenditure of public money for costly flood control projects.
- To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
- To minimize prolonged business interruptions.
- To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, and streets and bridges located in areas of special flood hazards.
- To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas.
- To ensure that potential buyers are notified that property is in an area of special flood hazard.
- To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

Other Regulations

Title 10, Chapter 1: Zoning Regulations

The zoning code is enacted for the purpose of promoting the health, safety, morals, convenience, order, prosperity and welfare of the present and future inhabitants of the town by lessening of congestion in the streets and roads, securing safety from fire and other dangers, providing adequate light and air; the classification of land uses and the distribution of land development and utilization, avoiding undue congestion of population, facilitating the adequate provision of transportation, water, schools, sewer and other public requirements; and by other means in accordance with a master plan and the zoning map adopted herewith.

Title 10, Chapter 5: Land Disturbance Regulations

This section of municipal code governs land development and the possible resultant erosion. The clearing, stripping and grading of land for nonagricultural uses can cause accelerated, localized erosion rates with subsequent deposition and damage to off-site properties and receiving drainageways. Erosion and sedimentation are natural processes whose intensity, when increased by development, can destroy the environmental, aesthetic and economic values of other properties, streams and lakes. The purpose of a land disturbance permit process is to reduce erosion and sedimentation.

Title 10; Chapter 6 Storm Drainage Regulations

Due to its general terrain and geographical location, the Town is particularly subject to damage from storm waters which, from time to time, overflow from existing water courses and drainage facilities. Presently existing storm drainage facilities, as well as future storm drainage facilities, require continuous operation, maintenance, renewal and replacement. Each owner of a lot or parcel of real property within the Town to the extent that he makes use of, and is served by, the Town's storm drainage facilities by contributing to those facilities storm water runoff beyond that amount (both in terms of peak rates and volumes) of storm water which would occur if that real property were undeveloped in its natural state, should pay for the use and the availability of use of such facilities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

- Distribution of flood related info
- Wildfire precaution
- Potable water conservation
- Morrison and Jeffco Emergency Management Office worked together on the installation of an emergency warning alert siren/voice message system in the Town to provide alerts related to flash flooding, wind related emergencies, hazmat incidents etc. The equipment was installed at the Town public workshops and will afford protection to most at risk residential and commercial areas of the Town. Activation to be provided by Jeffco Sheriff's Office.

F.6.1 Opportunities for Enhancement

Based on the capability assessment, Morrison 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. Table 2-15 in the Base Plan shows the potential financial benefits from increasing the Town's Community Rating System class. Other future improvements may be the incorporation of risk and hazard information into future comprehensive plan updates.

F.7 Plan Implementation and Maintenance

Morrison has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the Town will continue public participation in the plan maintenance process.

F.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Town of Morrison recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms.

F.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the Town to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The 2008 Town of Morrison Comprehensive Plan sets forth policies related to creating and adopting natural hazard regulations in order to guide development. The next full update of the Town's Plan should also cross-reference the 2015 Jefferson County Hazard Mitigation Plan to reinforce the goals and recommendations specified within this document.

The Town Administrator will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. Arvada The Town Administrator will also be responsible for representing the Town on future Jefferson County HMPC meetings, and for coordination with town staff and departments during plan updates. The Town, Police Department, and Fire District will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by Town Council.

The Town of Morrison will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

F.8 Mitigation Strategy

The Town of Morrison has adopted the hazard mitigation goals and objectives developed by the Planning Team and described in Section 6.2 of the Base Plan.

The Town had six mitigation actions in the 2016 Plan, and has completed one of them:

- Multi-Jurisdictional Storm Ready Program Participation

The remaining actions have been carried over into the 2021 Plan, along with seven new actions.

F.8.1 National Flood Insurance Program

Recognizing the importance of the National Flood Insurance Program (NFIP) in mitigating flood losses, the Town of Morrison will place an emphasis on continued compliance with the NFIP. As an NFIP participant, the Town has 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 as well as review of any potential development in special flood hazard areas.

F.8.2 Mitigation Actions

The local planning team identified and prioritized the following mitigation actions for the Town of Morrison based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation

Table F-25 Town of Morrison Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Morrison 1	Relocation of Town Shops. Morrison town shops are located adjacent to Bear Creek in a flood zone. Equipment necessary for flood recovery is stored in these shops. Relocation to safer location would protect equipment from damage/loss due to flash flooding. Benefits include building and equipment costs.	Flood	2; FWS, S&S	Town Administrator - Town of Morrison	\$50,000 plus site acquisition and development costs Town general fund, Jefferson County Open Space	High	Listed on town capital improvements 5 year plan	Not Started. This action has not been implemented, but continues to be a priority for the Town of Morrison. A parcel has been identified for purchase, and funding for the land and structure are included in the Town's 5-year capital plan. The Town has received a BRIC award for mitigation project scoping, and this project will be included in the scoping report, improving funding eligibility.
Morrison 2	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program. The Town of Morrison participates in the National Flood Insurance Program and the Community Rating System. The Town implements sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated to or above the base flood elevation. This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified	Flood	2; FWS	Floodplain Engineer: Charles Weiss, Bowman Consulting	Low Covered in existing budget	Medium	Ongoing	Annual Implementation. The Town's Comprehensive Plan will be updated in 2021, information from the 2016 HMP and this HMP Update once adopted, will contribute to the CP update. This will further Morrison's ongoing goal to implement and improve floodplain management practices. In 2017 the Town's GIS database was updated, and now includes current layers for the location of existing critical infrastructure.

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	<p>Floodplain Manager (CFM) status. Other activities that could be included in this effort are:</p> <p>Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;</p> <p>Suggest changes to improve enforcement of and compliance with regulations and programs;</p> <p>Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;</p> <p>Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the County, Mile High Flood District, and Colorado Water Conservation Board. Evaluate activities that will improve Community Rating System ratings that may further lower the cost of flood insurance for residents</p>							Development plans that are submitted to the Town are reviewed for compliance to the Town's Floodplain and Storm Drainage Regulations.
Morrison 3	<p>Mitigation Project Scoping Report. Morrison has a significant exposure to damage from hazards such as flooding and fire, as well as exposure to earthquake and soil issues. To aid in the identification and prioritization of future mitigation projects, a Mitigation Project Scoping Report will be prepared. The benefit to preparation of this scoping report is substantial and could help to identify projects that and mitigate the risk associated with these events, and help to avoid predicted losses. This proposed project aligns with the goals of the Town's Comprehensive Plan and FEMA Mitigation Strategies.</p>	Earthquake, Erosion, Expansive Soils, Flood, Subsidence, Wildfire	2; TBD	Town Manager	\$56,000; FEMA BRIC Grant, Town general fund	High	Scheduled to begin Fall of 2021.	New in 2021
Morrison 4	<p>Critical Infrastructure Master Plans and Bridge Assessments. This project will Update the Water and Wastewater Master Plan, develop a new Stormwater Master Plan, and a new Transportation Master Plan. Morrison completed the preparation of a Water and Wastewater Master Plan in 2017. This plan will need to be updated in 2023. In addition,</p>	Flood, Wildfire	1,2,3; FWS	Town Manager	\$450,000; FEMA BRIC Grant, Town General Fund	Medium	Scheduled to begin Fall of 2022.	New in 2021

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	Morrison will prepare a Stormwater Master Plan and a Transportation Master Plan that includes bridge condition assessments, in order to identify local facility/road location, status, maintenance needs, capacity and deficiencies. The benefit to the preparation of these reports is substantial, they will improve the town's resiliency and will identify resilient infrastructure projects that help to mitigate the nearly \$53 million in predicted losses.							
Morrison 5	Critical Infrastructure Bridge Projects. Morrison completed the preparation of a Bridge Assessment in 2019. This report provided information on two bridges in the Town that require repair: the Morr-Canon Street Bridge and the Morr-South Park Avenue Historic Bridge. The Morr-Canon Street Bridge is also listed as structurally deficient. The Spring Street Bridge and the Middle Street Alley Bridge have also been assessed for repair/ replacement. The town of Morrison will begin assessing and affecting repair/ replacement to these bridges that provide critical access for emergency vehicles both in responding in a timely manner to incidents such as ambulance calls, to larger events such as wildland fire and these facilities provide access for a large percentage of the town's residents. Morrison bridges that require repair in order to maintain access for approximately 50% of the population and their replacement/repair will improve fire access to wildland urban interface fire risk areas.	Wildfire	2,3; TRN	Town Manager	\$1.51 million; FEMA BRIC Grant, Town General Fund	High	Fall 2023	New in 2021
Morrison 6	Water Treatment Plant Upgrades. Morrison completed the preparation of a Water and Wastewater Master Plan in 2017. This Plan provided information on the Morrison's water and wastewater systems, and identified system needs in order to improve the town's resiliency through improving existing systems, adding redundancy, and improving storage volume	Cyber, Drought, Flood, Winter Storm, Wildfire	2; FWS	Town Manager	\$5,000,000; FEMA BRIC Grant, Town General Fund	Medium	2025	New in 2021

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	needed for potable water and firefighting. Identified upgrades to the Town Water Treatment Plant include membrane and pretreatment upgrades, addition of altitude valves, analysis/repair of existing distribution system, rehabilitation of the interconnection meter vault, MCMD Storage Tank rehabilitation, rockfall mitigation along the raw water pipeline, and MCMD Bear Creek Diversion abandonment. This will help protect the Town from economic losses associated with system failure, and failure to provide adequate potable water and inability to treat wastewater has wide implications, including potential closure of a large assisted living facility, along with schools, Town Hall and other local businesses. Residents depend on these services, which benefit the entire population and visitors, which drive the town's economy. The avoided losses are difficult to evaluate, but they would likely be equivalent to the \$51 million of projected loss associated with wildfire predicted in the 2016 HMP.							
Morrison 7	Wastewater Treatment Plant Upgrades. Morrison completed the preparation of a Water and Wastewater Master Plan in 2017. This Plan provided information on the Morrison's water and wastewater systems, and identified system needs in order to improve the town's resiliency through improving existing systems, adding redundancy, and improving storage volume needed for potable water and firefighting. Identified upgrades to the Town Wastewater Treatment Plant include site preparation, SBR concrete basin and equipment, filtration unit, screw press solids dewatering facility, yard piping, sewage pump and electrical controls. . This will help protect the Town from economic losses associated with system failure, and failure to provide adequate potable water and inability to treat	Cyber, Drought, Flood, Winter Storm, Wildfire	2; FWS	Town Manager	\$5,000,000; FEMA BRIC Grant, Town General Fund	Medium	2025	New in 2021

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	wastewater has wide implications, including potential closure of a large assisted living facility, along with schools, Town Hall and other local businesses. Residents depend on these services, which benefit the entire population and visitors, which drive the town's economy. The avoided losses are difficult to evaluate, but they would likely be equivalent to the \$51 million of projected loss associated with wildfire predicted in the 2016 HMP.							
Morrison 8	New Municipal Building. Morrison's Town Hall and Police Department are currently situated in the historic downtown area, and is within 1% Annual Chance floodplain, less than 500' from a regulatory floodway. This location has presented challenges for the Town and critical first responder services and equipment are not readily accessible in all conditions. The need for relocation has been identified as a priority by the Town's governing body, in order to maintain the Town's continuity of government during periods of flooding and other catastrophic events. In times of flooding, services to residents can be interrupted should the building become inundated or inaccessible. The relocation of the Town's fundamental operations to a new building will not only provide a safe place for day to day operations for Town staff and equipment, but can act as an emergency/evacuation shelter in times of catastrophic flooding. This protects the Town's fleet assets valued at \$100,000 and building contents valued at \$400,000, and avoids the potential for loss of life (priceless value) and property if first responders are unable to respond to threats in a timely and effective manner. The town is partnering with Jeffco Open Space to augment parking at this facility to add additional parking for Jeffco's Mt. Falcon Open Space, which will directly improve Open Space access for emergency response.	Dam Failure; Flood	2,3; COM, FWS, S&S	Town Manager	\$10 million; Town's General Fund	High	2023	New in 2021. The project is included in the Town's 2021 five-year Capital Improvements Plan.



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Morrison 9	<p>Pedestrian Safety Projects. Upon completion of the Transportation Master Plan, which will scrutinize roadways and other aspects of the Town's transportation system, the Town anticipates the addition of a trail along SR8 to provide pedestrian access from the Post Office to the existing Mt. Falcon trail. Currently, elementary students walk along the side of the highway, and are not protected from vehicles traveling at a high rate of speed. The project could result in a wide trail, that could also be used by emergency vehicles or as a detour should the highway become obstructed. Because this project provides protection to young pedestrians, it is difficult to assess avoided loss, because it could involve avoiding loss of a priceless young life. Adding an ancillary emergency detour route, which could be used to access the school, is also an important aspect of this project.</p>	Life Safety	1,2,3;	Town Manager	\$200,000; Town's General Fund	Medium	2024	New in 2021



Annex G. Arvada Fire Protection District

G.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. Arvada Fire Protection District (FPD) contributed to the development of the 2016 Plan and City of Arvada Annex as a stakeholder, but decided to participate as an adopting jurisdiction in the 2021 Plan. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

G.2 Community Profile

Arvada Fire Protection District provides fire protection and emergency medical services for 43 square miles covering the City of Arvada as well as the northern portion of the City of Wheat Ridge and portions of unincorporated Jefferson County. The FPD helps to protect approximately 133,000 citizens and has nearly 200 employees (Arvada FPD 2019).

The Arvada Fire Protection District service area is displayed in Figure G-1. Social Vulnerability scores for the District can be seen in Figures 2-2 through Figure 2-6 in Section 2 of the Base Plan. Generally, the District ranks low or below average on each of the social vulnerability categories. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

G.2.1 Growth and Development Trends

In the past five years, growth on the western edge of the Arvada Fire Protection District's jurisdiction has become a concern for the FPD in terms of increased exposure to fire within the wildland urban interface (WUI). Many if not all of the areas being developed are prone to high winds and have open areas of vegetation increasing the risk of fires being able to spread through these vegetated areas to the developed areas.

G.3 Hazard Identification and Risk Summary

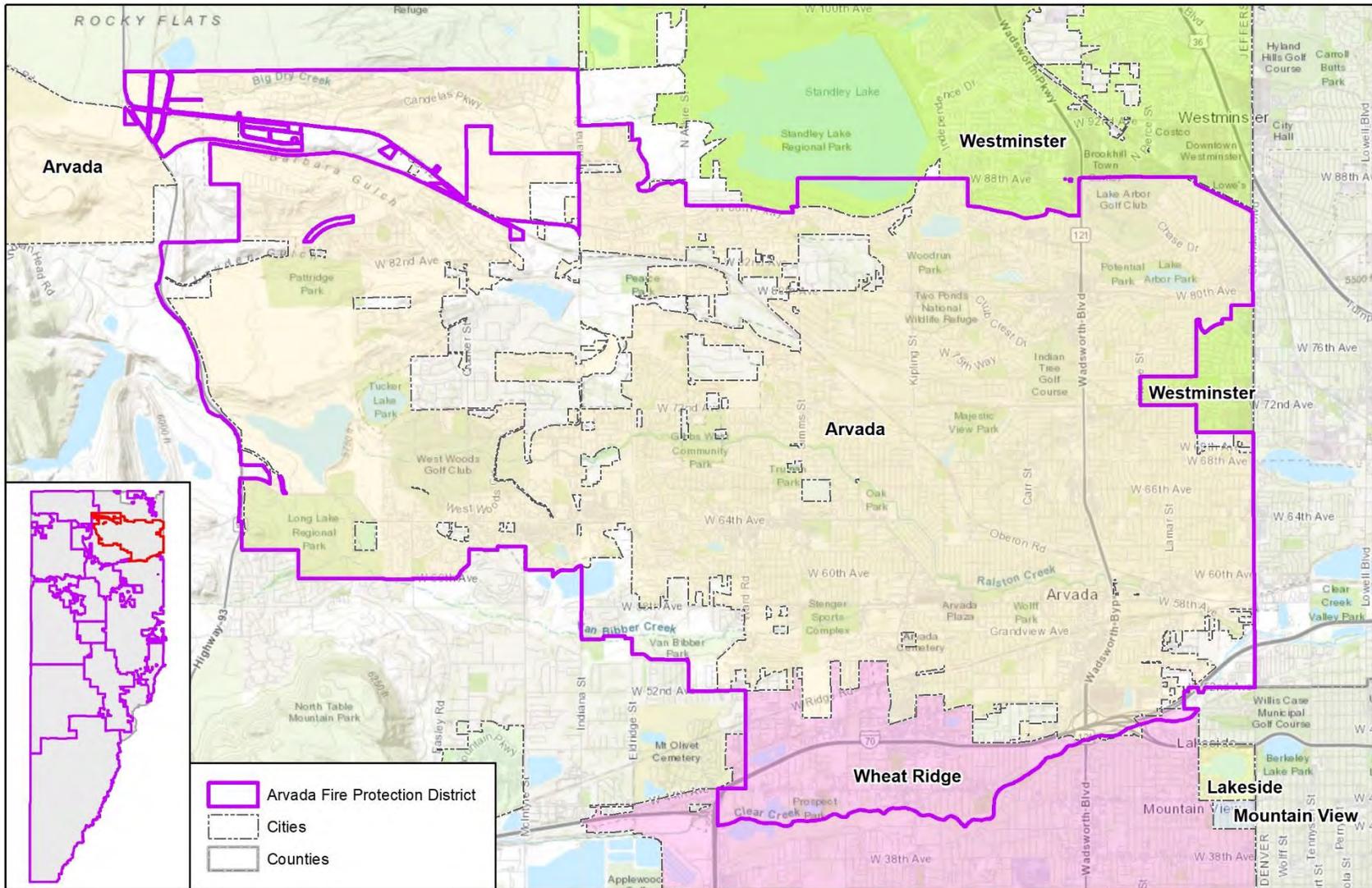
A hazard identification and vulnerability analysis was completed for the Arvada Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County. Table G-1 summarizes Arvada Protection District's hazards.

The hazard significance listed in Table G-1 is based on Arvada Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this, the most significant hazards for the Arvada Fire Protection District are dam failure, flood, hailstorm, severe winter storm, and wildfire.



Figure G-1 Arvada Protection District Service Area Service Area



Arvada Fire Protection District
 Cities
 Counties



Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

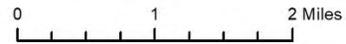




Table G-1 Arvada Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Extensive	Occasional	Significant	Medium
Dam Failure	Significant	Occasional	Critical	High
Drought	Extensive	Likely	Critical	Medium
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Extensive	Likely	Limited	Medium
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Critical	High
Hailstorm	Significant	Likely	Critical	High
Landslide, Debris flow, Rockfall	Limited	Likely	Negligible	Medium
Lightning	Limited	Highly Likely	Limited	Medium
Pandemic/Public Health	Extensive	Occasional	Significant	Medium
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Medium
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Significant	Likely	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



G.4 District Asset Inventory

Table G-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table G-2 Critical Facilities within District Boundaries

Lifeline	Critical Facility Type	Count
Communications	Cellular	1
	Land Mobile Private Towers	61
	Microwave Service Towers	68
	Paging Transmission	1
Energy	Electric Substation	9
	Power Plant	2
Hazardous Materials	Tier II	26
Health and Medical	Clinic	1
	Nursing Home	48
Safety and Security	EOC	1
	Fire Station	8
	Government Facility	5
	Law Enforcement	2
	School	42
Transportation	Aircraft Facility	1
	Bridge	98
Total		374

Source: HIFLD and CERC

Table G-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table G-3 Arvada Fire Protection District Assets

Name of Asset	Address	Replacement Value (\$)
Station 1	7900 W 57th Ave	2.6 mil
Station 2	5250 Oak St	2.8 mil
Station 3	7300 Kipling St	700,000
Station 4	6845 W 68th Ave	1.9 mil
Station 5	8100 Vance St	1.7 Mil
Station 6	6503 Simms St	3.8 mil
Station 7	8027 Alkire St	2.8 mil
Station 8	6385 Quaker St	2.8 mil
Training Center	6651 Indiana St	5.1 mil
Sub-station	15481 W 93rd Pl	575,000
Maintenance	16490 W 64th Ave	1.6 mil
Central Supply	12195 W 52 Ave	500,000
Old Station 7	9190 W 84th Ave	375,000
Headquarters	7903 Allison Way	3.0 mil

Source: HMPC



G.5 Vulnerability Assessment

The intent of this section is to assess the District’s vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the Arvada Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District’s risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

G.5.1 Dam Incidents/Failure

Figure 4-7 in Section 4.3.3 of the Base Plan shows potential dam inundation areas in the Arvada Fire Protection District, primarily along Ralston Creek, Clear Creek, and Van Bibber Creek. There are a number of high hazard potential dams upstream of the District exposing 126 critical facilities. Based on the GIS analysis conducted, bridges and communication towers within the District’s boundaries have the greatest exposure to a dam failure event, both of which could greatly complicate respond and evacuation. Results of the analysis is shown in Table G-4 and is organized by critical facility type and FEMA Lifeline.

Table G-4 Critical Facilities within District Boundaries at Risk to Dam Failure

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	24
	Microwave Service Towers	13
	Paging Transmission	1
Hazardous Material	Tier II	16
Health and Medical	Nursing Home	1
	EOC	1
	Government Facility	1
	Law Enforcement	2
Safety and Security	School	10
Transportation	Bridge	57
Total		126

Source: HIFLD and CERC

Low Head Dams

A low head dam is an engineered structure built into and across stream and river channels. Low head dams were historically built for a variety of purposes to support industrial, municipal, and agricultural water usage through the diversion of water from streams. Low head dams have also been built to provide recreational amenities for boating, rafting and tubing as well as improve aquatic habitats (Colorado DNR). Water flows over the dams creating a recirculating current that can trap unknowing river users. Due to the low height of this type of dam, low head dams can be difficult to see by river users that are not aware of them and because of the tranquil pool that gives the appearance there is no danger. There are 5 low head dams identified in the City of Arvada along Ralston Creek. Of these 5 low head dams, 4 are categorized as “grade control structure” and 1 as “diversion dam”. There are also four grade and control structure dams along Clear Creek on the southern portion of the FPD’s boundaries with the City of Wheat



Ridge. If an incident was to occur along Ralston Creek or Clear Creek Arvada FPD's Special Operations Ice and Water Rescue unit would be respond to the incident. Refer to Figure 4-9 in Section 4.3.3 of the Base Plan for the location of low head dams within the Arvada FPD's boundaries.

G.5.2 Flood

According to the GIS analysis (Refer to Section 4 of Base Plan for a description of the methodology), the Arvada Fire Protection District has critical facilities exposed to 1% annual chance flood hazard and the 0.2% annual chance flood hazard. Risk is primarily along Ralston Creek, Van Bibber Creek and Clear Creek. In total there are 67 critical facilities exposed to flooding within the District boundaries. A majority of which are located within the 0.2% annual flood chance areas. Bridges (46) are the most exposed to both the 1% and 0.2% annual flood hazard, followed by land mobile private towers (10) and Tier II facilities (6). Table G-5 and Table G-6 shows the results of the analysis by critical facility type and FEMA Lifeline.

Table G-5 Critical Facilities within District Boundaries at Risk to 1% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	5
	Microwave Service Towers	1
Hazardous Material	Tier II	1
Transportation	Bridge	29
Total		36

Source: HIFLD and CERC

Table G-6 Critical Facilities within District Boundaries at Risk to 0.2% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	5
	Paging Transmission	1
Hazardous Material	Tier II	5
Health and Medical	Nursing Home	1
Safety and Security	School	2
Transportation	Bridge	17
Total		31

Source: HIFLD and CERC

G.5.3 Geologic Hazards

Arvada Fire Protection District has exposure to some geologic hazards including subsidence and dipping bedrock. The exposure to geologic hazards is within in the western portions of the District within the City of Aurora. Refer to Figure 4-23 in section 4.3.7 of the Base Plan. Results of the GIS analysis there are eight critical facilities exposed to subsidence hazards. In addition, there are ten critical facilities exposed to dipping bedrock hazard. Results of the analysis are shown in Table G-7 and Table G-8.

Table G-7 Critical Facilities within District Boundaries at Risk to Subsidence

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	3
	Microwave Service Towers	2
Energy	Electric Substation	2
	Power Plant	1
Total		8

Source: HIFLD and CERC

Table G-8 Critical Facilities within District Boundaries at Risk to Dipping Bedrock

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	2
	Microwave Service Towers	2
Energy	Electric Substation	2
	Power Plant	2



FEMA Lifeline	Critical Facility Type	Count
Hazardous Materials	Tier II	1
Transportation	Bridge	1
Total		10

Source: HIFLD and CERC

G.5.4 Wildfire

Past Events

The following wildfire event is noted in the Arvada FPD Data Collection Guide.

December 25, 2016 – Wind driven fire on the Western Edge of the Leyden Rock Community at 82nd Avenue east of Highway 93 and west of Culbera Street. The fire damaged a fence of the Republic Service Foothills Landfill and caused damaged to several fire department vehicles.

August 8, 2020 – Mulch Pile Fire, Pioneer Sand property, 7608 Highway 93, Golden, Colorado. A wind driven fire that began in a pile of mulch at Pioneer Sand that spread to the open space around the facility. Business impacts included loss of revenue for Pioneer Landscaping due to damage to the mulch.

October 11, 2020 - 40+ acres of land that was burned with multiple homes in direct line of fire front. The fire began in the Pioneer Landscaping property and extended to the Western edge of Spring Mesa subdivision. Approximately \$10,000 worth of fencing was damaged. Significant loss of property was averted by mitigation efforts with the HOA and utilities prior to the event. CODE RED notification was used to notify residents in the direct path of the need to evacuate.

Estimating Losses

Arvada Fire Protection District does have exposure risk to wildfire both in terms of critical facilities and parcels/structures along the western portions of the District boundaries. According to the GIS based analysis of wildfire, Arvada FPD has a total of 34 critical facilities at risk to wildfire (Table G-9) or 9% of the total critical facilities within the District. A majority of the critical facilities are exposed to the lowest (19) wildfire risk followed by moderate (10) wildfire risk.

Table G-9 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
19	5	10	0	0	34	9%

Source: HFLID and CERC

G.6 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.

G.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table G-10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Arvada Fire Protection District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table G-10 Foothills Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	No	Currently working with the City of Arvada to put together a plan and implement.



Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General or Comprehensive plan	No	Jeffco Comp. Plan, Foothills Community Plan
Zoning ordinance	No	Jeffco
Subdivision ordinance	No	Jeffco
Growth management ordinance	No	Jeffco
Floodplain ordinance	No	Jeffco
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	Jeffco
Building code	Yes	Jeffco 2018 IFC
Fire department ISO rating	Yes	ISO rating of 2
Erosion or sediment control program	No	Jeffco
Stormwater management program	No	Jeffco
Site plan review requirements	Yes	Jeffco
Capital improvements plan	No	
Economic development plan	No	
Local emergency operations plan	No	
Other special plans	No	
Flood insurance study or other engineering study for streams	No	Jeffco
Elevation certificates (for floodplain development)	No	Jeffco
BCEGS Ratings	No	Jeffco

G.6.2 Administrative/Technical Mitigation Capabilities

Table G-11 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table G-11 Foothills Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Comments
Planner/engineer with knowledge of land development/land management practices	No	Jeffco
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No	Jeffco
Planner/engineer/scientist with an understanding of natural hazards	No	Jeffco
Personnel skilled in GIS	No	Jeffco
Full time building official	No	
Floodplain manager	No	Jeffco
Emergency manager	No	Jeffco
Grant writer	No	
Other personnel	No	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	No	Jeffco
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Code Red



Arvada Fire Protection District Strategic Plan 2015-2020

This responsibility is accomplished through an aggressive program of diverse training and a continual commitment to customer care.

- Post-Flood Recovery Assistance Plan - City of Arvada, Colorado
- Ice and Snow Removal Plan
- Ralston Reservoir and Upper and Lower Long Lake Dams Emergency Preparedness Plan (Denver Water Department)
- Emergency Operations Plan: Utilities Department, Water Supply Annex

G.6.3 Fiscal Mitigation Capabilities

Table G-12 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table G-12 Foothills Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?
Community Development Block Grants	No	No
Capital improvements project funding	No	No
Authority to levy taxes for specific purposes	No	No
Fees for water, sewer, gas, or electric services	No	No
Impact fees for new development	No	No
Incur debt through general obligation bonds	No	No
Incur debt through special tax bonds	No	No
Incur debt through private activities	No	No
Withhold spending in hazard prone areas	No	No
Stormwater Service Fees	No	No

G.6.4 Mitigation Outreach and Partnerships

For the past couple of years, Arvada FPD has begun to forge a partnership with the City of Arvada and the HOA's on the western edge of Arvada FPD's jurisdiction. Several education sessions have been held with the HOA's and information provided as to how to be a safer WUI area. Additional information on public outreach activities is listed in Table G-13.

Table G-13 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Currently active in the HOA groups of the developments on the Western edge of Arvada Fire's jurisdiction
Firewise	No, currently working with the City of Arvada to put together a plan and to work on implementation.
StormReady	N/A
Other	Have met with the HOA's in the area, spoken of the Ready, Set, Go program, have distributed literature and educational materials as well.

G.6.5 Opportunities for Enhancement

Based on the capability assessment, Arvada FPD has several existing mechanisms in place that already help to mitigate hazards. The District has identified the continued education of the HOA's, the City of Arvada and the homeowners in the area as once capabilities enhancement. Continuing to expand the education and involving more stake holders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs.



G.7 Plan Implementation and Maintenance

The Arvada Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

G.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Arvada Fire Protection District did not formally participate in or adopt the 2016 Plan.

G.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Captain Timothy McMahon, Arvada Fire Protection District will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. Captain Timothy McMahon also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

G.8 Mitigation Strategy

Arvada Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District did not have any mitigation actions in the 2016 Plan. They have developed two new actions for 2021 in conjunction with the City of Arvada.

Mitigation Success Story: A WUI fire that occurred on October 11, 2020 on the western edge of the Spring Mesa subdivision and the impact and severity of the fire was lessened due to mitigation work completed by Arvada FPD and the HOA. Education that had occurred with the HOA's about the need to cut back vegetation on the edge of the subdivision significantly reduced the amount of damage that could have occurred during a wind driven fire event that occurred. The damage that did occur, only to fences, was minimal and significantly less than would have been had there still been tall fuels in the area that the fire burned.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

H&M: Health & Medical

ENG: Energy

S&S: Safety & Security

FWS: Food, Water, Sheltering

TRN: Transportation

HAZ: Hazardous Waste



Table G-14 Arvada Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Arvada Fire 1	Develop a CWPP in partnership with the City of Arvada. Both organizations have the goal of developing a CWPP for Arvada. This plan will identify the risks associated with development in the WUI/PUI and the projects that will mitigate the risk. Implementation of the projects is an interest of neighborhood-level groups like HOAs. Though Arvada does not have the highest risk in Jeffco for hazards typically identified in a CWPP, there is absolutely a benefit with understanding our specific risk better and working to minimize it as best we can as the City continues to grow in the PUI and toward the WUI.	Drought; Wildfire; Windstorm;	1; 2; 3; S&S; COM; TRN;	Arvada Fire; City of Arvada Office of Emergency Management	Less than \$10,000 FEMA Hazard Mitigation Grant Programs	High	2026	New in 2021
Arvada Fire 2	Arvada Fire/City of Arvada Office of Emergency Management Collaboration. Continue partnership with Arvada Fire and other organizations to implement joint neighborhood-level resilience and community risk reduction work. This work is currently focused on the Wildland Urban Interface areas of the Arvada Fire Protection District on the western boundary. Work is being done to educate the HOA's of the importance of maintaining open space areas on their borders with shortened grass and overgrowth. Work is also being done with the City of Arvada trying to maintain the areas that the City is responsible for.	Drought; Wildfire; Windstorm;	1; 3; S&S; COM;	Arvada Fire; City of Arvada Office of Emergency Management	Covered in existing budget Covered in existing budget	High	Annual Implementation	New in 2021

Annex H. Elk Creek Fire Protection District

H.1 Background and Planning Process

This Annex was added during the development of the 2021 Jefferson County Hazard Mitigation Plan. The Elk Creek Fire Protection District was a new participant during the 2021 update process. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

H.2 Community Profile

The Elk Creek Fire Protection District is located in western Jefferson County. Containing the communities of Aspen Park, Conifer, Pine Junction, and portions of Pine, Evergreen, and Bailey, the District serves approximately 98 square miles and 15,000 residents. The Elk Creek Fire Protection District service area is displayed in Figure H-1

The Elk Creek Fire Protection District is staffed by 2 Chief Officers, 9 full time Firefighters and Paramedics, 2 seasonal Wildland Firefighters, 1 District Administrator, and is supplemented by 41 volunteer Firefighters/EMS Providers. There are 4 Fire Stations operated by the District, as shown in Table H-3

The Elk Creek Fire Protection District service area is displayed in Figure H-1. Social Vulnerability scores for the District can be seen in Figures 2-2 through Figure 2-6 in Section 2 of the Base Plan. Generally, the District ranks low or below average on each of the social vulnerability categories. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

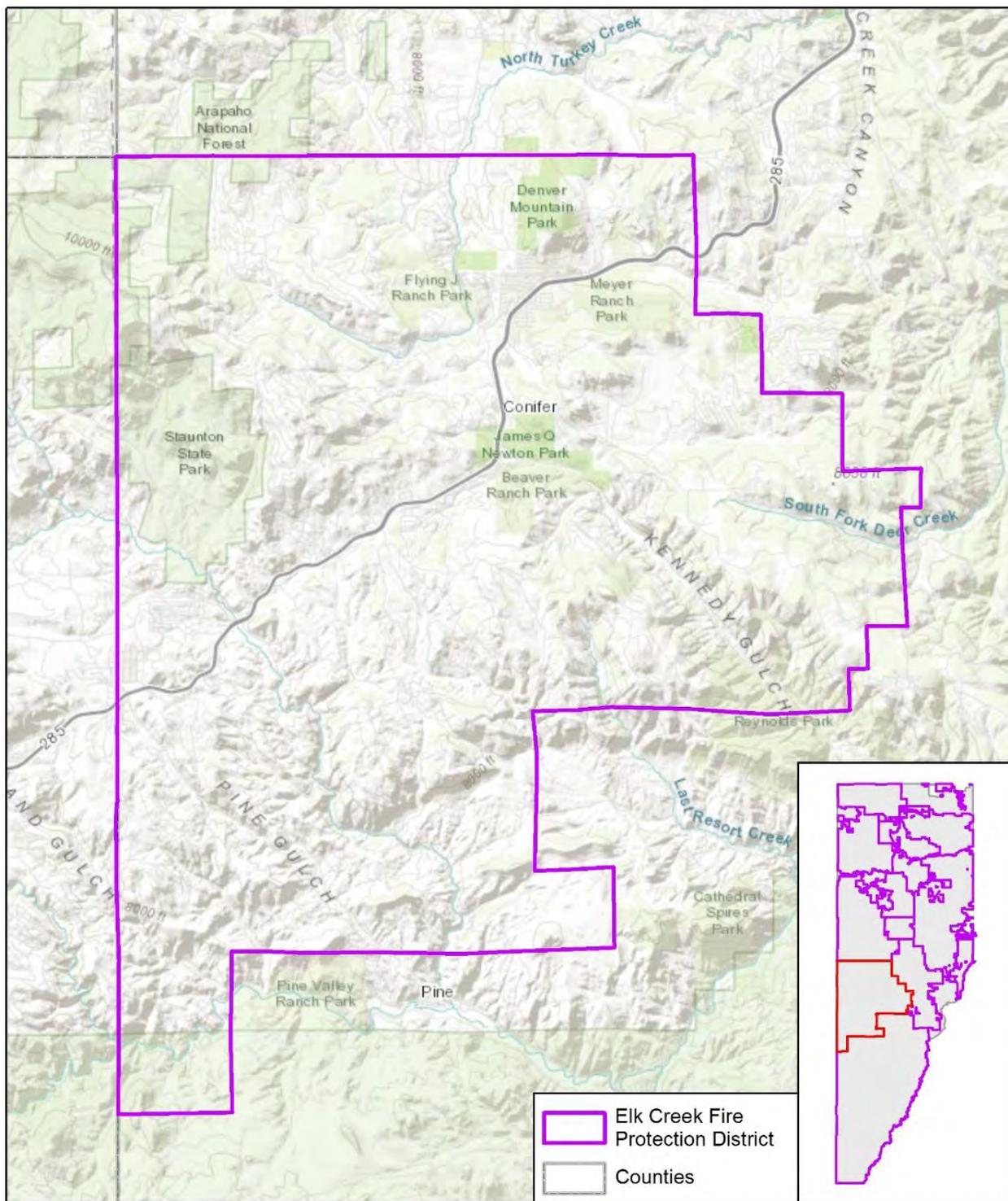
H.2.1 Growth and Development Trends

Maintaining the mountain community character of Elk Creek is a primary concern of residents. New development, both commercial and residential, needs to be well planned and designed in order to meet the unique and sometimes restrictive environment of the mountains. An issue of particular concern is platting. Many of the areas in Elk Creek were platted in the 1920's and 1930's. These plats created individual lots, many of which are as small as 50' x 50' in size. As individual lots, they do not meet current buildable standards for septic/leach fields or setbacks. The consequences of continuing to allow building on these old plats in the mountains are the obvious continued degradation of water supplies, and overcrowding of County and community roads. Features that make Elk Creek unique are its open space, visual resources, historic sites, rural character and abundance of wildlife. New development in Elk Creek needs to take all of these characteristics into consideration in order to plan wisely for the future.

The Elk Creek Community Plan was approved by the Jefferson County Planning Commission on July 24th, 2013. It guides the land use rules and regulations for the Elk Creek Community. General land use recommendations take into consideration forest health and fire mitigation practices.

Since adoption of the Jefferson County Comprehensive Master Plan in 2010, both the policies in the Elk Creek Community Plan and policies in the Comprehensive Master Plan apply to land use proposals. Specific policies in the Community Plan are still applicable, but general policies in the Comprehensive Master Plan now take precedent over the general policies in the Community Plan.

Figure H-1 Elk Creek Fire Protection District Service Area



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 2.5 5 Miles



H.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the Elk Creek Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide, which was distributed to each participating municipality or special district to complete during the plan update process in 2020.

Each participating jurisdiction and special district was in support of the main hazard summary identified in the base plan; however, the hazard summary for each annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the District's risk and vulnerabilities from that of the overall County. Table H-1 summarizes the Elk Creek Fire Protection District's hazards. For the 2021 plan update, the Elk Creek Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table H-1 is based on Elk Creek Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Elk Creek Fire Protection District are hailstorm, lightning, severe winter storms and wildfire.

Table H-1 Elk Creek Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Potential of Future Occurrence	Geographic Extent	Potential Severity Magnitude	Overall Significance
Avalanche	Unlikely	Limited	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Unlikely	Negligible	Negligible	Low
Drought	Likely	Extensive	Limited	Medium
Earthquake	Unlikely	Extensive	Catastrophic	Low
Erosion and Deposition	Occasionally	Significant	Limited	Low
Expansive Soils	Unlikely	Limited	Negligible	Low
Extreme Temperatures	Likely	Extensive	Limited	Medium
Flood	Occasionally	Limited	Limited	Medium
Hailstorm	Likely	Extensive	Negligible	High
Landslide, Debris flow, Rockfall	Occasionally	Limited	Negligible	Medium
Lightning	Highly Likely	Extensive	Negligible	High
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Highly Likely	Extensive	Limited	High
Subsidence	Occasionally	Significant	Negligible	Low
Tornado	Unlikely	Extensive	Catastrophic	Low
Wildfire	Highly Likely	Extensive	Catastrophic	High
Windstorm	Likely	Extensive	Limited	Medium
Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.		Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year. Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.		

H.4 District Asset Inventory

Table H-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table H-2 Critical Facilities within District Boundaries

Lifeline	Critical Facility Type	Count
Communications	Cellular	4
	Land Mobile Private Towers	42
	Microwave Service Towers	19
	Paging Transmission	2
Energy	Electric Substation	4
Food, Water, Shelter	Wastewater Plant	5
Hazardous Material	Tier II	3
Safety and Security	Fire Station	4
	Government Facility	1
	School	4
Transportation	Bridge	12
	Government Facility	4
TOTAL		104

Source: HIFLD and CERC

Table H-3 Elk Creek Fire Protection District Assets

Name of Asset	Address	Vulnerabilities
Elk Creek Fire Station 1	11993 Blackfoot Road, Conifer, CO	Wildfire
Elk Creek Fire Station 2	650 Mount Evans Boulevard, Pine, CO	Wildfire
Elk Creek Fire Station 3	10956 Timothy's Drive, Conifer, CO	Wildfire
Elk Creek Fire Station 4	9737 Rhodus Street, Conifer, CO	Wildfire

Source: HMPC

H.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separately from that of the County as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the Elk Creek Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District's risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

H.5.1 Dam Incidents/Failure

There is no dam inundation risk in the Elk Creek Fire Protection District.

H.5.2 Flood

Elk Creek Fire Protection District has limited exposure to flood risk, with no critical facilities in mapped floodplains.

H.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the Elk Creek Fire Protection District.

H.5.4 Wildfire

Elk Creek Fire Protection District does have exposure risk to wildfire both in terms of critical facilities and structures in WUI communities.

According to the GIS based analysis of wildfire, Elk Creek FPD has a total of 78 critical facilities at risk to wildfire (Table H-4).

Table H-4 Critical Facilities within District Boundaries at Risk to Wildfire

Fire Risk	Number of Facilities
Lowest	14
Low	24
Moderate	19
High	21
Highest	0
Total	78

Source: Wood analysis on data provided by Jefferson County, Elk Creek FPD

Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. That is the reason for the asset inventory provided in section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

H.6 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.

H.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table H-5 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Elk Creek Fire Protection District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table H-5 Elk Creek Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	2005
General or Comprehensive plan	No	Jeffco Comp. Plan, Elk Creek Community Plan
Zoning ordinance	No	Jeffco
Subdivision ordinance	No	Jeffco

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Growth management ordinance	No	Jeffco
Floodplain ordinance	No	Jeffco
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	Jeffco
Building code	Yes	Jeffco
Fire department ISO rating	5/10	
Erosion or sediment control program	No	Jeffco
Stormwater management program	No	Jeffco
Site plan review requirements	Yes	Jeffco
Capital improvements plan	No	
Economic development plan	No	Jeffco
Local emergency operations plan	No	Jeffco
Other special plans		
Flood insurance study or other engineering study for streams	No	Jeffco
Elevation certificates (for floodplain development)	No	Jeffco

H.6.2 Administrative/Technical Mitigation Capabilities

Table H-6 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table H-6 Elk Creek Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Wildland Captain	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No		Jeffco
Planner/engineer/scientist with an understanding of natural hazards	No		Jeffco
Personnel skilled in GIS	Yes	Wildland Captain	
Full time building official	No	Part Time Fire Marshall	
Floodplain manager	No		Jeffco
Emergency manager	No		Jeffco
Grant writer	Yes	Grant Writer	
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	Command Staff	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No		Jeffco

H.6.3 Fiscal Mitigation Capabilities

Table H-7 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table H-7 Elk Creek Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	Yes	No	
Capital improvements project funding	Unknown	Unknown	
Authority to levy taxes for specific purposes	Yes	Yes	
Fees for water, sewer, gas, or electric services	No	Unknown	
Impact fees for new development	No	Unknown	This has been discussed but not implemented
Incur debt through general obligation bonds	Yes	No	
Incur debt through special tax bonds	Yes	Unknown	
Incur debt through private activities	Yes	Unknown	
Withhold spending in hazard prone areas	No	Unknown	

H.6.4 Mitigation Outreach and Partnerships

Table H-8 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table H-8 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Rotary Wildfire Ready, Community Ambassador Program
Firewise	Multiple communities have the Firewise designation
StormReady	No

H.6.5 Opportunities for Enhancement

Based on the capability assessment, Elk Creek FPD has several existing mechanisms in place that already help to mitigate hazards. Continuing to expand the education and involving more stake holders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs.

Elk Creek FPD will also work to better coordinate with Larimer County to enhance and expand fire district programs (Community Ambassadors, Wildfire Prepared, Chipping, Landscape Scale restoration, fuel breaks).

H.7 Plan Implementation and Maintenance

The Elk Creek Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

H.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Elk Creek Fire Protection District recognizes and acknowledge the importance of hazard mitigation and has worked to integrated and incorporate hazard information into existing planning mechanisms.

H.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The Elk Creek Fire Chief will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Fire Chief will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

H.8 Mitigation Strategy

The Elk Creek Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District did not have any mitigation actions in the 2016 Plan. They have developed one new action for 2021.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation

Table H-9 Elk Creek Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Elk Creek 1	Evacuation planning and communication improvement. The past couple of years have produced fires that required evacuations. A number of them have been unsuccessful for a number of reasons. A hard look at evacuation programs and a reassessment of new tools could be in order. This would be applicable to a number of hazards in Jeffco.	Dam Failure; Earthquake; Flood; Landslides; Tornado; Wildfire; Pandemic; Windstorm;	1; 2; 3; S&S; FWS; H&M; COM; TRN; HAZ;	Emergency Management Office; All response agencies and partners that support hazard reduction	\$100,000 - \$1,000,000 FEMA, National Grants, reorganization of county funds already allocated.	High	1-2 years	New in 2021.
Elk Creek 2	CWPP Update. The last update was in 2005. The new report will highlight past mitigation efforts and identify areas of high risk. Data from the new CWPP will be used to guide mitigation, preplanning and public education efforts in the future.	Wildfire	1; 2; 3; S&S; FWS	Elk Creek Fire Protection District; Inter Canyon Fire Protection District, The Ember Alliance	\$10,000 - \$100,000; Department Budget	High	Fall of 2021	New in 2021.



Annex I. Evergreen Fire Protection District

I.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. Evergreen Fire Protection District (EFPD) fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section J.6. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

I.2 Community Profile

The Evergreen Fire Protection District (EFPD – also known as Evergreen Fire Rescue) is situated approximately 30 miles west of Denver on the eastern slopes of Mount Evans. The elevation of Evergreen is approximately 7,500 feet and the elevation within the fire district ranges from 6,720 to 10,500 feet. As its name implies, Evergreen is a heavily forested region that is dissected by streams and expansive grassy meadows. Evergreen Fire Rescue serves nearly 30,000 residents across EFPD's more than 120 square miles. Subdivision characteristics range from rugged ridge top developments to luxury fairway homes. Commercial development is primarily service oriented and concentrated along primary roadways.

The Evergreen Fire Protection District service area is displayed in Figure I-1. Social Vulnerability scores for the District can be seen in Figures 2-2 through Figure 2-6 in Section 2 of the Base Plan. Generally, the District ranks low or below average on most social vulnerability categories, although some portions of the District have above average household composition and disability vulnerability. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

I.2.1 Growth and Development Trends

Development within the District continues to grow. To achieve a balance between natural and man-made environments, housing recommendations have been related to the natural features of the mountain environment, e.g., ground water and septic suitability constraints, transportation constraints, geologic and flood hazards, slope, meadows, wildlife, vegetation, and scenic views.

When development is proposed, the characteristics of the site are identified and development impacts are evaluated. It is during the development review process that the wildlife and visually sensitive areas are identified, the ability of the roads to carry additional traffic is determined, the water and sanitation concerns are noted, and the availability of services is identified.

The Evergreen Area Community Plan (2018) created and identified policies to ensure certain high hazard areas had special regulations. These regulations regard development in:

- Meadows and areas with low screening potential
- Geologic hazard areas
- Flood hazard areas
- Wildfire hazard areas

The Plan also created slope standards, as well as density and location standards.

There are two subdivisions under construction in the District, as of 2018. There are also sporadic individual home construction outside planned subdivisions. In the past 3 years, approximately 60 single family homes and a multi-family residential complex have been built.

All new homes go through the Jefferson County or Clear Creek County defensible space and hazard mitigation process. For the most part commercial properties are just tenant finishes and re-classifications of occupancies.



It should be noted that since adoption of the Jefferson County Comprehensive Master Plan in 2010, both the policies in the Conifer/285 Corridor Area/Evergreen Area Community Plan and policies in the Comprehensive Master Plan apply to land use proposals. Specific policies in the Community Plan are still applicable, but general policies in the Comprehensive Master Plan now take precedent over the general policies in the Community Plan.

I.3 Hazard Identification and Risk Summary

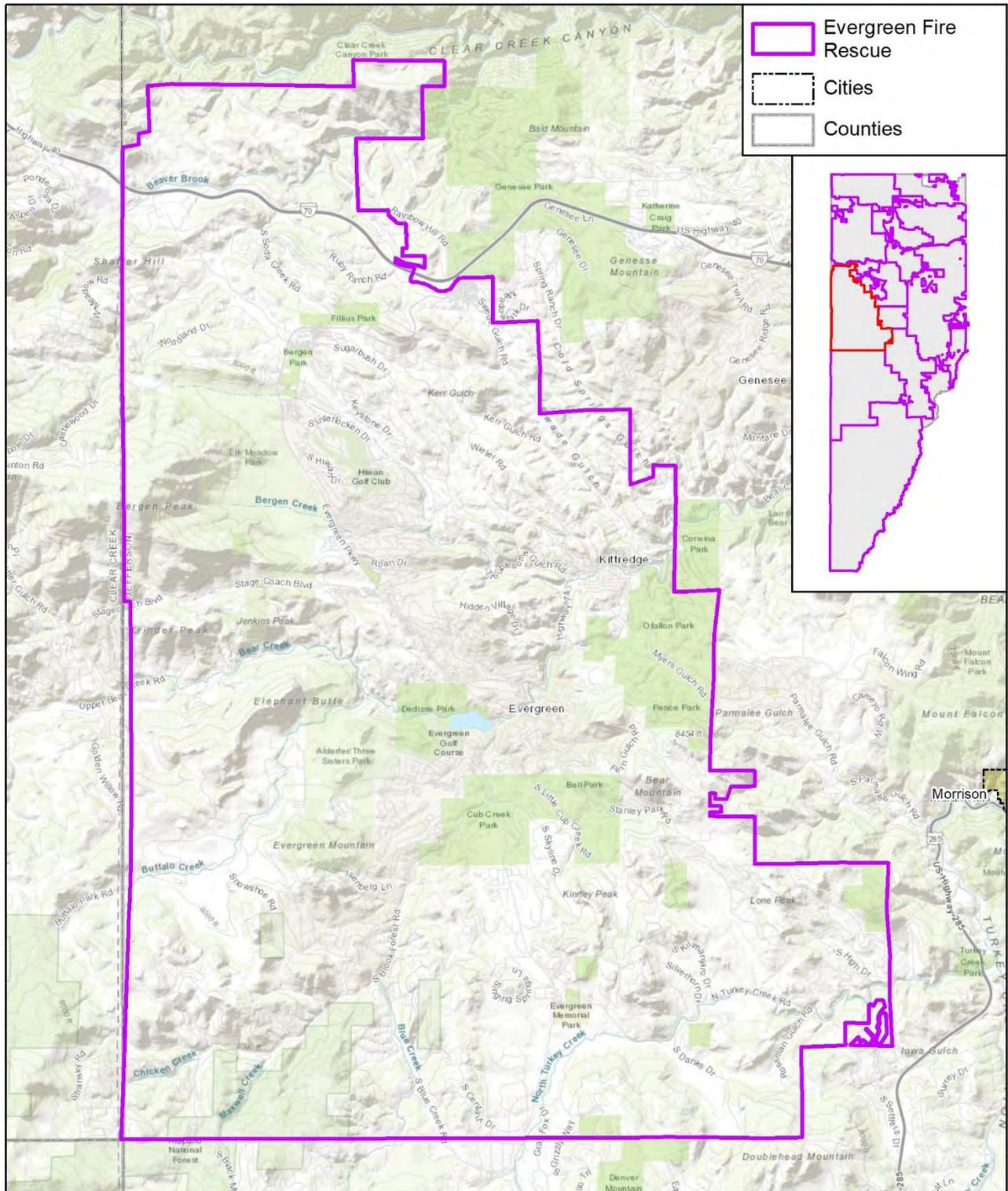
A hazard identification and vulnerability analysis was completed for the Evergreen Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide, which was distributed to each participating municipality or special district to complete.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County. Table I-1 summarizes Evergreen Fire Protection District's hazards. For the 2015 plan update, the Evergreen Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table I-1 is based on Evergreen Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Evergreen Fire Protection District are drought, flood, hail, pandemic, winter storm, and wildfire.



Figure I-1 Evergreen Fire Protection District Service Area



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

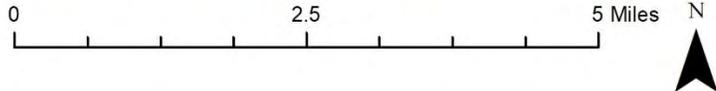




Table I-1 Evergreen Fire Protection District – Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Limited	Occasional	Critical	Medium
Drought	Extensive	Likely	Critical	High
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Negligible	Likely	Limited	Low
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Critical	High
Hailstorm	Significant	Likely	Critical	High
Landslide, Debris flow, Rockfall	Limited	Likely	Limited	Medium
Lightning	Limited	Highly Likely	Limited	Medium
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Low
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Significant	Highly Likely	Limited	Medium

Geographic Extent

Negligible: Less than 10 percent of planning area or isolated single-point occurrences
Limited: 10 to 25 percent of the planning area or limited single-point occurrences
Significant: 25 to 75 percent of planning area or frequent single-point occurrences
Extensive: 75 to 100 percent of planning area or consistent single-point occurrences

Potential Magnitude/Severity

Negligible: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.
Limited: 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.
Critical: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.
Catastrophic: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.

Probability of Future Occurrences

Unlikely: Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.
Occasional: Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Likely: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years
Highly Likely: Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.

Overall Significance

Low: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.
Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating.
High: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.



I.4 District Asset Inventory

Table I-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table I-2 Critical Facilities within District Boundaries

FEMA Lifeline	CF Type	Count
Communications	Cellular	3
	FM Transmission	1
	Land Mobile Private Towers	33
	Microwave Service Towers	8
Energy	Electric Substation	1
Food, Water, Shelter	Wastewater Plant	3
Hazardous Material	Tier II	3
Health and Medical	Nursing Home	2
Safety and Security	Fire Station	7
	Government Facility	4
	Law Enforcement	1
	School	11
Transportation	Bridge	37
	Government Facility	3

Source: HIFLD and CERC

Table I-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table I-3 Evergreen Fire Protection District's Assets

Name of Asset	Replacement Value (\$)
Admin. Building	\$3,667,748
Station 1	\$1,239,819
Station 2	\$2,335,507
Station 3	\$882,000
Station 4	\$688,479
Station 5	\$565,776
Station 6	\$565,776
Station 7	\$565,776
Station 8	\$565,776
Training Tower	\$584,601
Maintenance	\$1,796,443

Source: HMPC

I.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separately from that of the County as a whole, which has already been addressed in the Vulnerability Assessment in the base plan. For more information about how hazards affect the County as a whole, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the Evergreen Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or



where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District's risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

I.5.1 Dam Incidents/Failure

Figure 4-8 in Section 4.3.3 of the Base Plan shows potential dam inundation areas in the Evergreen Fire Protection District, primarily along Bear Creek and its tributaries. There are several high and significant hazard potential dams upstream of the District exposing seven critical facilities, six of which are bridges. Results of the analysis is shown in Table I-4 and is organized by critical facility type and FEMA Lifeline.

Table I-4 Critical Facilities within District Boundaries at Risk to Dam Failure

FEMA Lifeline	Critical Facility Type	Count
Food, Water, Shelter	Wastewater Plant	1
Transportation	Bridge	6
TOTAL		7

Source: HIFLD and CERC

I.5.2 Flood

As shown in Figure 4-35 in the base plan, the Evergreen Fire Protection District has a number of structures exposed to 1% annual chance flood hazard and the 0.2% annual chance flood hazard. Risk is primarily along Bear Creek and its tributaries. There are 35 critical facilities exposed to flooding within the District boundaries, a majority of which are located within the 1% annual flood chance areas; this represents 30% of the identified critical facilities in the District. Bridges (21) are the most exposed, followed by communications towers (7). Table I-5 and Table I-6 shows the results of the analysis by critical facility type and FEMA Lifeline.

Table I-5 Critical Facilities within District Boundaries at Risk to 1% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	7
Food, Water, Shelter	Wastewater Plant	1
Safety and Security	Fire Station	1
	Government Facility	1
Transportation	Bridge	21
Total		31

Source: HIFLD and CERC

Table I-6 Critical Facilities within District Boundaries at Risk to 0.2% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Safety and Security	Government Facility	2
	Law Enforcement	1
Transportation	Bridge	1
Total		4

Source: HIFLD and CERC

I.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the Evergreen Fire Protection District.



I.5.4 Wildfire

Past Events

The following wildfire events had notable impact on the Evergreen Fire Protection District:

March 2011 Soda Creek Road

In March of 2011 a wildfire ignited near South Soda Creek Road by suspected human cause. The fire burned 6 acres, threatened 7 structures and forced approx. 200 evacuations before it was contained by the 62 volunteer fire fighters that responded to the call.

April 2011 Highway 103

In April of 2011 a wildfire of unknown origin burned approximately 10 acres near Highway 103 and Evergreen Parkway. Five different fire agencies responded to the call which caused evacuation of several homes in the vicinity.

June 2013 Blue Bell Lane

In June of 2013 a wildfire in private property near the Arapaho National Forest burned between 25-35 acres causing residents in 143 homes to be evacuated, but no structures were ultimately damaged. The cause of the blaze was a 48' tree that came into contact with power transmission lines.

July 2020 Elephant Butte, Upper Bear Creek Road Fire

In July of 2020 a wildfire on private property and Denver Mountain Park property burned between 50-60 acres causing residents in 1,000 homes to be evacuated, but no structures were ultimately damaged. The cause of the blaze is undetermined.

Estimating Losses

As shown in Figures 4-49 through 4-43, Evergreen Fire Protection District does have exposure to wildfire risk, including significant WUI risk. There are a total of 73 critical facilities at risk to wildfire (Table I-7) or 62% of the total critical facilities within the District. A majority of the critical facilities are exposed to high (38) or moderate (28) wildfire risk.

Table I-7 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
2	5	28	38	0	73	62%

Source: HFLID and CERC

I.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

I.6 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.

I.6.1 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-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 Evergreen Fire Protection District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.



Table I-8 Evergreen Fire Protection District's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	2020
General or Comprehensive plan	NA	County
Zoning ordinance	NA	County
Subdivision ordinance	NA	County
Growth management ordinance	NA	County
Floodplain ordinance	NA	County
Other special purpose ordinance (stormwater, steep slope, wildfire)	NA	County
Building code	NA	County
Fire department ISO rating	Yes	See below
Erosion or sediment control program	NA	County
Stormwater management program	NA	County
Site plan review requirements	Yes	
Capital improvements plan	NA	County
Economic development plan	NA	County
Local emergency operations plan	NA	County
Other special plans	NA	County
Flood insurance study or other engineering study for streams	NA	County
Elevation certificates (for floodplain development)	NA	County
BCEGS Ratings	NA	County

Evergreen FPD CWPP: The District has a Community Wildfire Protection Plan, updated in 2020. The plan was developed for the District with guidance and support from the Colorado State Forest Service. The CWPP was developed according to the guidelines set forth by the Healthy Forests Restoration Act (2003) and the Colorado State Forest Service's Minimum Standards for Community Wildfire Protection Plans (2004).

CWPIPs: Evergreen Fire coordinates and supports Community Wildfire Protection Implementation Plan (CWPIP), a plan that is similar to CWPPs in that it identifies vulnerabilities and provides guidance for mitigating the impacts of wildfires in each of the plan units identified in the CWPP. Plan units are established at the neighborhood/HOA level. There are currently 26 CWPIPs in the District.

Evergreen Fire Rescue Strategic Plan – 2014: This document was developed to guide the organization into the future with a strategy that will allow EFR to adapt to the changing environment of the community, the employees and volunteer firefighters and the needs of our and visitors. The plan includes a Standard of Cover (SOC) and a Risk Assessment (RA) to help the District identify how well it is providing emergency services to the community and what risks are within the community.

ISO Rating: Evergreen Fire District has multiple classifications. Effective as of May 29, 2018: Any property within five road miles of Station 1 (4751 Highway 73), Station 2 (1802 Bergen Parkway), Station 3 (6940 Highway 73), Station 5 (53 Echo Lake Dr.), Station 6 (26370 Hwy 74), Station 7 (157 County 65), or Station 8 (33377 Forest Estates Rd) are rated as a Class 4. Property within 5 miles of Station 1, 2, 6, or 7 AND within 1,000 feet of a fire hydrant has an ISO rating of 3. Brook Forest and Marshdale Elementary school fire hydrants are not recognized by ISO. Any property beyond 5 road miles from any of fire station is a 10. The District earned a Class 3 Rating because of high quality equipment and high level of training. The District's strategic plan identifies ways to further improve this rating.



Wildfire Training Exercises: Evergreen Fire Rescue has hosted and taken part in annual wildland fire training exercises held on residential property in the host fire district. Local homeowners have observed the exercises and were given advice on how to mitigate their property.

Slash Collection in Clear Creek and Jefferson County: Clear Creek County has a free slash collection site in Idaho Springs that the residents of Clear Creek County and in EFD may use. Jefferson County has slash collection sites throughout the County and used EFD’s Fire Station #8, Forest Estates and Brook Forest for weekend events.

I.6.2 Administrative/Technical Mitigation Capabilities

Table I-9 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table I-9 Evergreen Fire Protection District Administrative & Technical Mitigation Capabilities

Personnel Resources	Yes/No	Comments
Planner/engineer with knowledge of land development/land management practices	No	
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	Contract
Full time building official	No	
Floodplain manager	No	
Emergency manager	Yes	Clear Creek & Jefferson Counties
Grant writer	No	
Other personnel	No	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	Fire Prevention/Inspector
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Contracted with Jefferson County Emergency Communications Authority (JEFFCOM). Code Red, WEA, IPAWS

I.6.3 Fiscal Mitigation Capabilities

Table I-10 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table I-10 Evergreen Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	Yes	No	
Capital improvements project funding	Yes	Yes	Fuels Crew
Authority to levy taxes for specific purposes	Yes	Yes	Expand Wildfire education programs and hire seasonal fuels crew
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	Yes	No	
Incur debt through general obligation bonds	No	No	



Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Incur debt through special tax bonds	Yes	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	
Stormwater Service Fees	No	No	

I.6.4 Mitigation Outreach and Partnerships

Evergreen Fire Protection District conducts Fire Safety Programs taught to residences/students. Particular programs include: Hands on Fire Extinguisher Training for public and to Middle school students, CPR, Wildfire Awareness, Home fire safety and Senior Safety. The District plans to host 1-2 Wildfire forums/townhall meetings per year, which will include information on wildfire mitigation. Table I-11 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table I-11 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	CWPIPs & Wildfire Mitigation Groups (see I.6.1)
Firewise	Yes
StormReady	No

I.6.5 Opportunities for Enhancement

EFPD has initiated a Community Risk Reduction program. The goal of the program is to reduce all community risk through a holistic approach. All divisions within EFPD work across traditional division lines to promote risk adverse behavior within the community. All members are encouraged to be observant for risk conditions and behaviors and to be a source of assistance in mitigating these conditions. While several existing mechanisms are in place to mitigate hazards, EFPD will continue to expand education opportunities involving current stake holders and seeking to add more.

I.7 Plan Implementation and Maintenance

The Evergreen Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

I.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Evergreen Fire Protection District recognizes and acknowledge the importance of hazard mitigation and has worked to integrated and incorporate hazard information into existing planning mechanisms. For example, the 2007 CWPP was updated in 2020 to provide a new, updated and enhanced risk assessment of the Evergreen Fire Protection District. In addition, plan units (CWPIP) have been developed to facilitate mitigation strategies on a microscale District wide.

Additional risk reduction programs include E-Cares which is community paramedicine focused on injury and fall prevention, home fire prevention, wellness visits, and medication monitoring/reconciliation to name a few; E-Pad which focuses on the placement of AED's throughout the District and providing free CPR classes; EFPD has funded several full-time wildland personnel as well as a seasonal fuels mitigation crew; and the establishment of a Public Affairs group that utilizes multiple social media venues to provide incident notification, educational, and informational messages to the residents of the District. A current effort within the District is to encourage residents to sign up to Code Red, Smart 911 and Community Connect. An aspect of this effort is the use of a dedicated notebook computer at local events for sign up purposes.



I.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

EFPD Fire Marshal, Community Risk Reduction Division be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. EFPD Fire Marshal will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

I.8 Mitigation Strategy

Evergreen Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District had two mitigation actions in the 2016 Plan, and has not completed either of them. Those actions have been carried over into the 2021 Plan, along with two new actions. Evergreen FPD has also started a chipping program in 2020, will continue to fund and support this program moving forward.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table I-12 Evergreen Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Evergreen Fire 1	Educate the Public on Wildfire Mitigation. Per the CWPP most of EFD (123 square miles) has an Extreme or High hazard rating. Conduct meetings with homeowners' associations, public and display booths at Wal-Mart, Home Depot and local grocery stores and hand out flyers, pamphlets, etc. We would also work with a few homeowners in our district on displaying their home to show what has been done for mitigation on their property and take photos, do a video and/or ask a local TV station to do a story on this. Continuation of wildfire mitigation training for our Community Education person, who will be conducting the public training. Benefits include Reduction of homes/property loss due to wildfires.	Wildfire	1	Evergreen Fire/Rescue Fire Prevention Section	\$8000 for handouts, pamphlets, banners and hiring a consultant to continue working with Homeowner Associations to create CWPIP's \$1000 for training personnel; Grants and private donations*	High	Within 2 years	In progress. Ongoing mitigation projects including defensible space, fuel breaks, restoration work and roadside thinning with EFR communities, EFR CWPP stakeholders and working with CSFS and other agencies with different grants.
Evergreen Fire 2	CWPIP Development and Implementation. Community Wildfire Protection Implementation Plans (CWPIPs) are developed by area residents with advice and assistance of the fire protection district. The CWPIPs detail priority mitigation actions on general recommendations made in the Evergreen CWPP. Priority will be to have CWPIP's for Extreme areas first then High areas, depending on the individual HOA's that request a CWPIP be completed. Benefits include Increased resiliency to wildfires.	Wildfire	2,3	Evergreen Fire/Rescue Fire Prevention Section	12000 State, FireWise	Medium	Current and ongoing	In progress. EFR continues to work with community education through its Wildland Division, Public Affairs group and working with our CWPIP/Plan Units, Evergreen Rotary, Evergreen Chamber and many other organizations.
Evergreen Fire 3	Priority fuels projects identified in the 2020 EFR CWPP update. Many fuels projects that range from fuel breaks, roadside thinning in non-survivable roadways, community CWPP defensible space work, chipping program, forest	Wildfire;	1; 2; 3; S&S; FWS; H&M; COM;	Evergreen Fire Rescue and working with Jefferson County and other partners.	More than \$1,000,000 Federal grants, State grants, private	High	Continue the work we are currently doing and expand with	New in 2021



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	restoration and home assessment program (Wildfire Prepared). The benefit of these projects is to make Evergreen Fire Protection District a more resilient community to wildfire and to create the live with wildfire environment and community in the future.		TRN; HAZ;	USFS, DMP, Jefferson County Open Space, Water districts	matching funds, department funds, County funds.		the goal of having a fire adapted community in the next 10-15 years.	
Evergreen Fire 4	Witter Gulch/Floyd Hill Defensible Space. If awarded CWPIP grant, to complete 40 Homes over a 3 year period just with this grant. The project will be in the Witter Gulch and Floyd Hill areas if awarded. This is part of a FRWRM grant. Some of the issues will be admin work/time for EFR and coordinating homeowners. The benefits will be 40 more homes with defensible space.	Wildfire	1; 2; 3; S&S	Evergreen Fire Rescue; CSFS, DFPC, DMP and USFS.	\$100,000 - \$1,000,000; CWPIP Grant	High	If awarded, fall 2021 to fall of 2024.	New in 2021. Note project is located in Clear Creek County.



Annex J. Fairmount Fire Protection District

J.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. Fairmount Fire Protection District (FFPD) (also known as Fairmount Fire Rescue) fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section J.6. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

J.2 Community Profile

The community of Fairmount is located between the towns of Golden, Arvada, and Wheat Ridge in the northern region of Jefferson County, see service area map in Figure J-1. The community has experienced rapid growth, as have the needs for fire, paramedical and emergency response. The 2019 Census Bureau estimates the population at 10,000. There is an estimated workday population increase of 6,000 to 8,000. The Fairmount Fire Protection District is a combination department currently employing 27 career firefighters and staff, and 40 volunteer firefighters.

The Fairmount Fire Protection District service area is displayed in Figure J-1. Social Vulnerability scores for the District can be seen in Figures 2-2 through Figure 2-6 in Section 2 of the Base Plan. Generally, the District ranks low or below average on each of the social vulnerability categories. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

J.2.1 Growth and Development Trends

The mixed rural/urban area in the Fairmount community was organized into a fire protection district in 1962. The District is undergoing a transition as the area urbanizes, with approximately 25% of the land mass of the Fairmount community remaining rural as of 2021. The industrial area is primarily concentrated along the southern most edge of the district, which is also serviced by State Highway 58 and Interstate 70, as well as the Burlington Northern Railway. This concentration of infrastructure and transportation is highly vulnerable to hazards due to the potential of loss of life and critical services for the adjacent communities of Golden, Arvada, Wheat Ridge and Unincorporated Jefferson County.

Residential development along State Highway 93 continues at a fast pace adding homes and population to the communities of Fairmount, Arvada and Golden. In the past five years FFPD has seen extensive growth in residential housing making streets more congested and increasing call volume.

J.3 Hazard Identification and Risk Summary

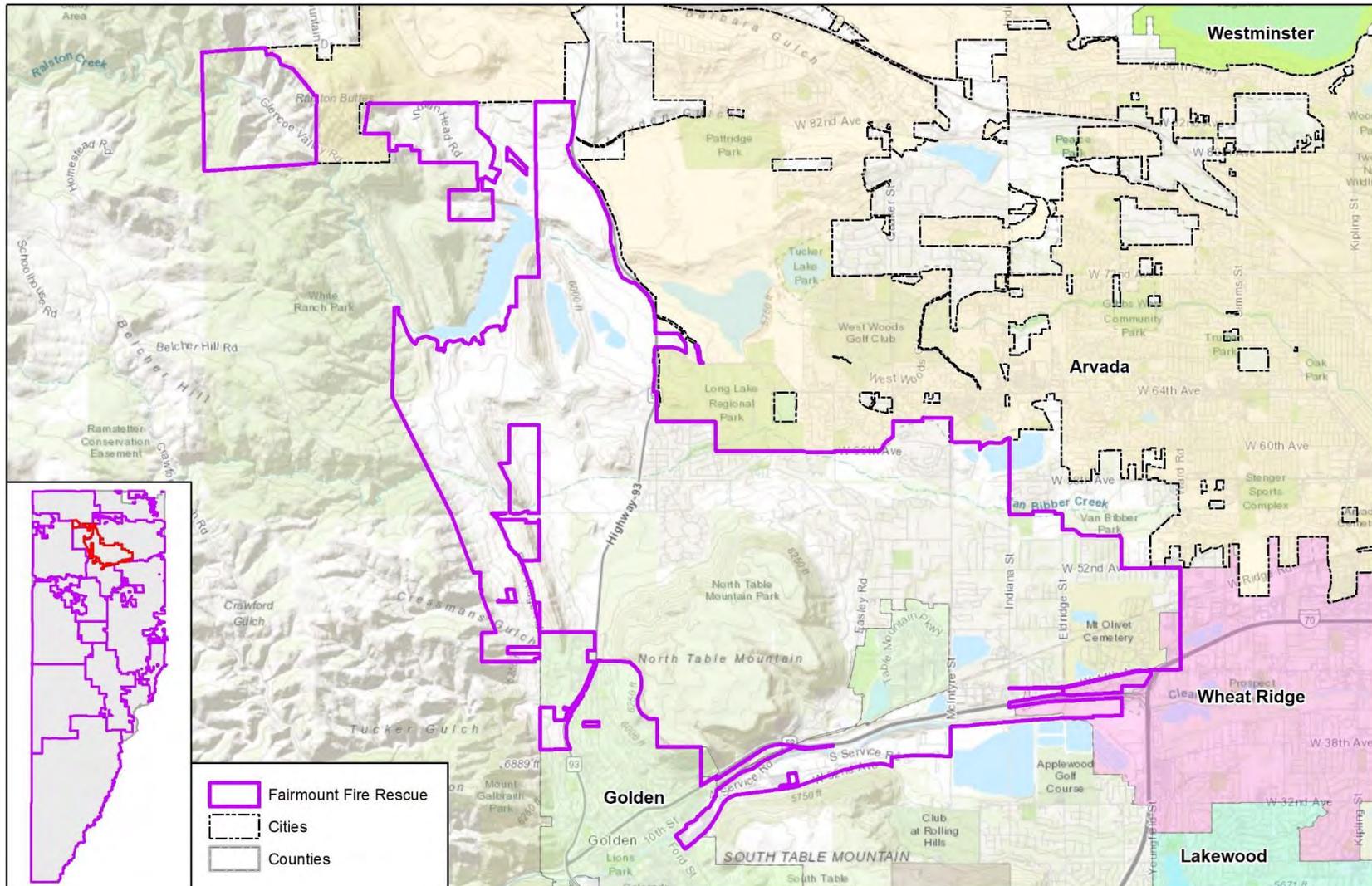
A hazard identification and vulnerability analysis was completed for Fairmount Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County. Table J-1 summarizes the District's hazards based on input provided during the planning and data collection process.

The hazard significance listed in Table J-1 is based on FFPD HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this, the most significant hazards for the District are dam failure, flood, hailstorm, severe winter storm, and pandemic.



Figure J-1 Fairmount Fire Protection District Service Area



wood. Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

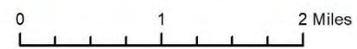




Table J-1 Fairmount Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Significant	Occasional	Critical	Medium
Dam Failure	Significant	Occasional	Critical	High
Drought	Significant	Likely	Limited	Medium
Earthquake	Significant	Unlikely	Critical	Medium
Erosion and Deposition	Limited	Likely	Limited	Medium
Expansive Soils	Significant	Likely	Limited	Medium
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Limited	High
Hailstorm	Significant	Likely	Limited	High
Landslide, Debris flow, Rockfall	Limited	Likely	Negligible	Medium
Lightning	Limited	Likely	Limited	Medium
Pandemic	Significant	Likely	Critical	High
Severe Winter Storms	Extensive	Likely	Limited	High
Subsidence	Limited	Occasional	Limited	Medium
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Likely	Critical	Medium
Windstorm	Significant	Likely	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



J.4 District Asset Inventory

Table J-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table J-2 Critical Facilities within District Boundaries

Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	34
	Microwave Service Towers	7
Energy	Electric Substation	2
Food, Water, Shelter	Water Facility	1
Hazardous Materials	Tier II	16
Health and Medical	Nursing Home	1
Safety and Security	Fire Station	3
	School	4
Transportation	Bridge	26
Total		95

Source: HIFLD and CERC

Table J-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table J-3 Fairmount Fire Protection District Assets

Name of Asset	Replacement value	Occupancy/ Capacity	Vulnerabilities
Fairmount Fire Station 31	\$7,000,000	65	None identified
Fairmount Fire Station 32	\$5,000,000	10	None identified
Fairmount Fire Station 33	\$5,000,000	20	None identified
Fairmount Fire Training Center	\$3,000,000	50	None identified

Source: HMPC

J.5 Vulnerability Assessment

The intent of this section is to assess Fairmount Fire Protection District’s vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see Risk Assessment.

This section provides a refined vulnerability assessment, specific for the Fairmount Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District’s risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm



For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

Dam Incidents/Failure

Figure 4-7 in Section 4.3.3 of the Base Plan shows potential dam inundation areas in the Fairmount Fire Protection District, primarily along Clear Creek and Ralston Creek. There are a number of high hazard potential dams upstream of the District exposing 31 critical facilities. Based on the GIS analysis conducted, communication towers within the District’s boundaries have the greatest exposure to a dam failure event. Results of the analysis is shown in Table J-4 and is organized by critical facility type and FEMA Lifeline.

Table J-4 Critical Facilities within District Boundaries at Risk to Dam Failure

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	18
Energy	Electric Substation	1
Food, Water, Shelter	Water Facility	1
Hazardous Material	Tier II	6
Safety and Security	Fire Station	2
Transportation	Bridge	3
Total		31

Source: HIFLD and CERC

Flood

According to the GIS analysis (Refer to Section 4 of Base Plan for a description of the methodology), the Fairmount Fire Protection District has critical facilities exposed to 1% annual chance flood hazard and the 0.2% annual chance flood hazard. Risk is primarily along Ralston Creek, Van Bibber Creek and Clear Creek. In total there are 20 critical facilities exposed to flooding within the District boundaries. A majority of critical facilities at risk are land mobile private towers with 13 exposed to the 1% annual flood hazard. Table J-5 and Table J-6 shows the results of the analysis by critical facility type and FEMA Lifeline.

Table J-5 Critical Facilities within District Boundaries at Risk to 1% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	13
Hazardous Material	Tier II	2
Transportation	Bridge	2
Total		17

Source: HIFLD and CERC

Table J-6 Critical Facilities within District Boundaries at Risk to 0.2% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Food, Water, Shelter	Water Facility	1
Hazardous Material	Tier II	1
Transportation	Bridge	1
Total		3

Source: HIFLD and CERC

Geologic Hazards

Fairmount Fire Protection District has exposure to some geologic hazards including subsidence and dipping bedrock. The exposure to geologic hazards is within in the western and northern portions of the District and mainly along Highway 93. Refer to Figure 4-23 in section 4.3.7 of the Base Plan. Results of the GIS analysis there is one Tier II facility exposed to subsidence hazard as well as 1 exposed to dipping bedrock. In addition, there are 6 bridges exposed to dipping bedrock hazard and 2 land mobile private towers. Results of the analysis are shown in Table J-7 and Table J-8.



Table J-7 Critical Facilities within District Boundaries at Risk to Subsidence

FEMA Lifeline	Critical Facility Type	Count
Hazardous Material	Tier II	1
Total		1

Source: HIFLD and CERC

Table J-8 Critical Facilities within District Boundaries at Risk to Dipping Bedrock

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	2
Hazardous Material	Tier II	1
Transportation	Bridge	6
Total		9

Source: HIFLD and CERC

Wildfire

Past Events

The following wildfire event is noted in the Section 4 of the Base Plan as taking place within the Fairmount FPD boundaries.

- September 7-9, 1988** – The North Table Mountain Fire burned between 1,300 and 2,000 acres. The human caused fire started off CO 93 and crossed the mountain, which threatened subdivisions on east side of mountain. Over 250 firefighters from 20 fire departments, the National Guard, and local law enforcement officers responded, in addition to a helicopter. In many areas, the focus was on structure protection and evacuation. The area included the top, west, and east sides of North Table Mountain.

Estimating Potential Losses

The FFPD does have exposure risk to wildfire both in terms of critical facilities and parcels/structures in WUI communities. According to the GIS based analysis of wildfire, the District has a total of 14 critical facilities are exposed to wildfire or 15% of the total critical facilities in the District. Similar to the results of the parcel analysis, a majority are located in the moderate wildfire risk areas (see Table J-9).

Table J-9 Critical Facilities within District Boundaries at Risk to Wildfire by Risk

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
4	1	6	3	0	14	15%

Source: HFLID and CERC

J.6 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.

J.6.1 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-10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the FFPD. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.



Table J-10 Fairmount Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	County and FFPD (2007)
General or Comprehensive plan	No	County
Zoning ordinance	No	County
Subdivision ordinance	No	County
Growth management ordinance	No	County
Floodplain ordinance	No	County
Floodplain Management Plan	No	County
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	County
Building code	No	County and FFPD adopted 2018 IFC
Fire department ISO rating	Yes	ISO 1
Erosion or sediment control program	No	County
Stormwater management program	No	County
Site plan review requirements	Yes	County and FFPD
Capital improvements plan	Yes	FFPD
Economic development plan	No	County
Local emergency operations plan	No	County
Other special plans	No	
Flood insurance study or other engineering study for streams	No	County
Elevation certificates (for floodplain development)	No	County
BCEGS Ratings	No	County

J.6.2 Administrative/Technical Mitigation Capabilities

Table J-11 identifies the personnel responsible for activities related to mitigation and loss prevention for Fairmount Fire Protection District.

Table J-11 Fairmount Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	County	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	County	
Planner/engineer/scientist with an understanding of natural hazards	Yes	County	
Personnel skilled in GIS	Yes	County	
Full time building official	Yes	County	FFPD for Fire Code
Floodplain manager	Yes	County	
Emergency manager	Yes	County	
Grant writer	No		
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	County	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	County and Jefferson County Communications Center Authority	
Resiliency Planner	No		
Transportation Planner	Yes	County	



J.6.3 Fiscal Mitigation Capabilities

Fiscal mitigation capabilities are financial tools or resources that Fairmount Fire Protection District could or already does use to help fund mitigation activities. Table J-12 lists the fiscal mitigation capabilities available to Fairmount Fire Protection District.

Table J-12 Fairmount Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	No	No	
Capital improvements project funding	No	No	
Authority to levy taxes for specific purposes	Yes	No	Mill levy only provides for emergency response within the community
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	No	No	
Incur debt through general obligation bonds	Yes	No	Only for capital improvements associated with district infrastructure
Incur debt through special tax bonds	No	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	
Stormwater Service Fees	No	No	

J.6.4 Mitigation Outreach and Partnerships

Table J-13 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table J-13 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Yes - External stakeholder outreach in 2021, along with using social media.
Firewise	Yes - Pass out literature at open houses, installing fire danger sign in 2021.
StormReady	No – Will need to research and get more information

In addition to the capabilities listed in Table J-13, the FFPD hosts Open Houses to educate the community on fire safety, household preparedness as well as Firewise best practices in the wildland urban interface. The District updated their social media platforms (Nextdoor, Facebook, Twitter and Instagram) in 2020.

J.6.5 Opportunities for Enhancement

Based on the capability assessment, FFPD has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the District to expand or improve on these policies and programs to further protect the community.

The FFPD will work to increase its public outreach through open houses and other events, along with added emphasis put into the use of social media platforms. Additionally, opportunities for enhancement



will be identified through electronic polling and in-person meetings with internal and external stakeholders. Once opportunities have been identified, they will then be prioritized for implementation.

J.7 Plan Implementation and Maintenance

The District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

J.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The District recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, the 2016 Hazard Mitigation Plan was incorporated into the District's Strategic Plan and Standards of Coverage.

J.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The FFPD Chief will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Chief will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

J.8 Mitigation Strategy

The FFPD has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District had two mitigation actions in the 2016 Plan, and has not completed either of them. Those actions have been carried over into the 2021 Plan, along with two new actions.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

H&M: Health & Medical

ENG: Energy

S&S: Safety & Security

FWS: Food, Water, Sheltering

TRN: Transportation

HAZ: Hazardous Waste



Table J-14 Fairmount Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Fairmount Fire 1	Update Community Wildfire Protection Plan. The current plan was completed in 2012 and is in need of review and update. Benefits include Hazard identification and mitigation.	Wildfire	2	Fairmount Fire Protection District	\$5,000; Firewise or district property taxes	Low	TBD based on funding	Not Started. No funding currently available.
Fairmount Fire 2	Standards of Cover. A formal Standards of Cover needs analysis is needed to validate the needed response necessary to address existing hazards and current response needs. The Commission on Fire Accreditation International (CFAI) defines the process, known as "deployment analysis," as written procedure which determines the distribution and concentration of fixed and mobile resources of an organization. The purpose for completing such a document is to assist the agency in ensuring a safe and effective response force for fire suppression, emergency medical services, and specialty response situations. Benefits include ensuring the proper response is available to mitigate identified hazards.	Lightning, Severe Winter Storms, Tornado, Wildfire, Windstorm	2,3	Fairmount Fire Protection District	50 personnel hours Property taxes	High	2021	In Progress. Currently in the planning phase
Fairmount Fire 3	Cyber Awareness and User Training. Reduce vulnerability to cyber attacks through employee education and increased security.	Cyber	2,3; COM, S&S	SANS, Center for Internet Security.	\$3,000-5,000 per year	High	As soon as funding is available	New in 2021
Fairmount Fire 4	Outdoor Covered Parking for Emergency Vehicles. Create covered parking at Stations 31 and 33 to protect District vehicles.	Extreme Temperatures, Hailstorm, Severe Winter Storm	2; S&S	FFPD	\$60,000. Grants and/or private	Medium	When funding available	New in 2021

Annex K. Foothills Fire Protection District

K.1 Background and Planning Process

This Annex was added during the development of the 2021 Jefferson County Hazard Mitigation Plan. The Foothills Fire Protection District was a new participant during the 2021 Jefferson County Hazard Mitigation Plan update process. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B. More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

K.2 Community Profile

The Foothills Fire Protection District was created January 1, 1997 when three independent Fire Protection Districts (Mount Vernon, Idledale, and Lookout Mountain Fire Districts) joined together to form a new District. According to the District's website, there are five firehouses to protect 25 square miles of varied terrain, from newer subdivisions with hydrants to heavily forested rural areas with domestic wells. Foothills Fire Protection District is also responsible for responding to motor vehicle accidents on nine miles of I-70 and incidents in Denver's 2,400-acre Genesee Park and 200-acre Lookout Mountain Park, as well as Jefferson County Open Space in Clear Creek Canyon. The Foothills Fire Protection District is governed by a board of five members, with a fire chief and a combination paid/volunteer staff of approximately 40 members.

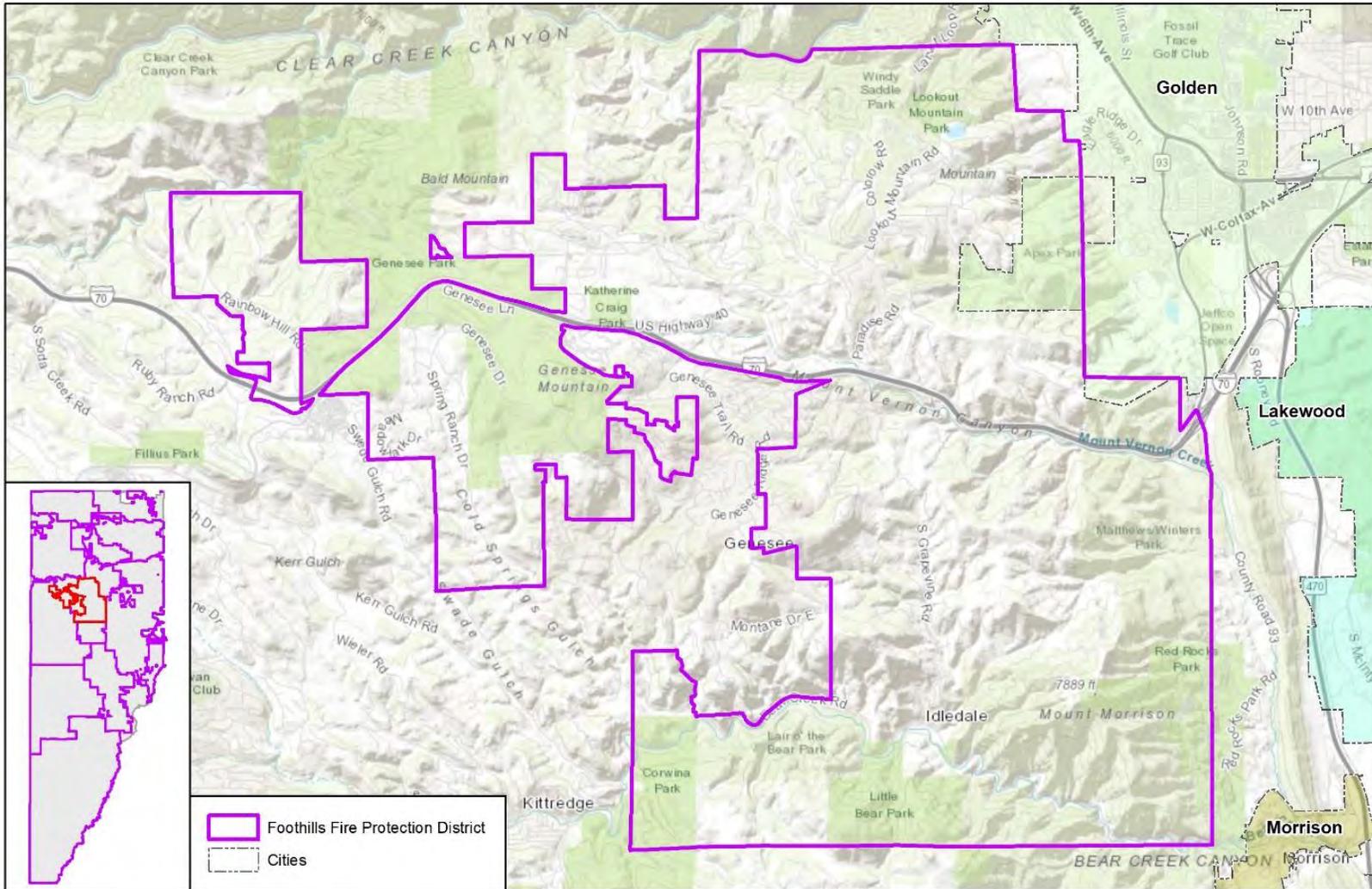
The Foothills Fire Protection District service area is displayed in Figure K-1. Social Vulnerability scores for the District can be seen in Figures 2-2 through Figure 2-6 in Section 2 of the Base Plan. Generally, the District ranks low or below average on each of the social vulnerability categories, however some areas in the eastern portion of the District rank above average in the socioeconomic status vulnerability category. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

K.2.1 Growth and Development Trends

Maintaining the mountain community character of the Foothills Fire District is a primary concern of residents. New development, both commercial and residential, needs to be well planned and designed in order to meet the unique and sometimes restrictive environment of the mountains. An issue of particular concern is platting. Many of the areas in Foothills Fire District were platted in the 1920's and 1930's. These plats created individual lots, many of which are as small as 50' x 50' in size. As individual lots, they do not meet current buildable standards for septic/leach fields or setbacks. The consequences of continuing to allow building on these old plats in the mountains are the obvious continued degradation of water supplies, and overcrowding of County and community roads. Features that make Foothills Fire District unique are its open space, visual resources, historic sites, rural character and abundance of wildlife. New development in Foothills Fire District needs to take all of these characteristics into consideration in order to plan wisely for the future.

The Foothills Community Plan was approved by the Jefferson County Planning Commission on July 24th, 2013. It guides the land use rules and regulations for the Foothills Fire Community. General land use recommendations take into consideration forest health and fire mitigation practices. Since adoption of the Jefferson County Comprehensive Master Plan in 2010, both the policies in the Foothills Fire Community Plan and policies in the Comprehensive Master Plan apply to land use proposals. Specific policies in the Community Plan are still applicable, but general policies in the Comprehensive Master Plan now take precedent over the general policies in the Community Plan.

Figure K-1 Foothills Fire Protection District Service Area



wood. Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles



K.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the Foothills Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction and special district in support of the main hazard summary identified in the base plan; however, the hazard summary for each annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the District's risk and vulnerabilities from that of the overall County. Table K-1 summarizes Foothills Fire Protection District's hazards. For the 2021 plan update, the Foothills Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table K-1 is based on Foothills Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Foothills Fire Protection District are flood, hailstorm, severe winter storms, and wildfire.

Table K-1 Foothills Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible/Limited	Unlikely	Negligible	Low
Cyber Attack	Limited	Occasional	Critical	Low
Dam Failure	Negligible	Occasional	Critical	Low
Drought	Extensive	Likely	Critical	Medium
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Negligible	Unlikely	Limited	Low
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Limited	Medium
Hailstorm	Significant	Likely	Critical	High
Landslide, Debris flow, Rockfall	Limited	Likely	Negligible	Medium
Lightning	Limited	Highly Likely	Negligible	Medium
Pandemic/Public Health	Significant	Unlikely	Critical	Low
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Medium
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Significant	Likely	Limited	Medium
Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.		Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year. Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.		

K.4 District Asset Inventory

Table K-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table K-2 Critical Facilities within District Boundaries

FEMA Lifeline	CF Type	Count
Communications	Cellular	1
	FM Transmission	16
	Land Mobile Private Towers	71
	Microwave Service Towers	89
	Paging Transmission	5
Food, Water, Shelter	Wastewater Plant	1
Hazardous Material	Tier II	2
Safety and Security	Fire Station	5
	Government Facility	3
	School	1
Transportation	Aircraft Facility	1
	Bridge	4
	Government Facility	2
TOTAL		201

Source: HIFLD and CERC

Table K-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table K-3 Foothills Fire Protection District Assets

Name of Asset	Address	Capabilities	Vulnerabilities
Rainbow Hills Station	28812 Rainbow Hill Road, Evergreen CO	3 Truck bays, admin office, training facilities	None identified
Lookout Mountain Station	67 S. Lookout Mountain Road	4 Truck bays	None identified
Idledale Station	21698 Miller Lane, Idledale CO	4 Truck bays	None identified
Grapevine Station	893 S. Grapevine Road	2 Truck bays	None identified
Mount Vernon Station	25191 Aspen Way	2 Truck bays	None identified

Source: HMPC

K.5 Vulnerability Assessment

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.

K.5.1 Dam Incidents/Failure

There is no dam inundation risk in the Foothills Fire Protection District.

K.5.2 Flood

Foothills Fire Protection District has limited exposure to flood risk compared to the rest of the County, as shown in Figure 4-34 in the Base Plan. The only identified critical facility in a mapped floodplain is one bridge in the 1% floodplain.

K.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the Foothills Fire Protection District. As shown in Figure 4-42 in the Base Plan, there are some areas at risk of landslide or rockfall near the northern and eastern boundaries of the District. The only identified critical facility at risk is one hazardous materials facility potentially exposed to risk of landslides.

K.5.4 Wildfire

Foothills Fire Protection District has significant risk to wildfire both in terms of critical facilities and parcels/structures in WUI communities.

According to the GIS based analysis of wildfire, Foothills FPD has a total of 181 critical facilities at risk to wildfire (Table K-4), the majority of which are at moderate risk. This represents 90% of the critical facilities identified in the District.

Table K-4 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
0	4	157	20	0	181	90%

Source: Wood analysis on data provided by Jefferson County, Foothills CWPP

K.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. That is the reason for the asset inventory provided in section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

The following recent event was identified by the planning team as having significant impacts on the Foothills Fire Protection District:

May 8, 2017 Severe Thunderstorm and Large Hail: A severe afternoon thunderstorm impacted the Denver Metropolitan area, significantly impacting Jefferson County. Specific to the District, the HMPC noted that this event impacted areas of the Unincorporated County and the entire fire district. No deaths and only minor injuries were reported, with damage to buildings, windows, vehicles, and roofs throughout the District. There were several businesses forced to close for repairs following this event. This was the most expensive hailstorm ever in Colorado.

K.6 Capability Assessment

Capabilities are the programs and policies currently in use by the Foothills Fire Protection District 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.

K.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table K-5 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table K-5 Foothills Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	2020
General or Comprehensive plan	NA	Town/County
Zoning ordinance	NA	Town/County
Subdivision ordinance	NA	Town/County
Growth management ordinance	NA	Town/County
Floodplain ordinance	NA	Town/County
Other special purpose ordinance (stormwater, steep slope, wildfire)	NA	Town/County
Building code	NA	International Fire Code 2018
Fire department ISO rating	Yes	3
Erosion or sediment control program	NA	Town/County
Stormwater management program	NA	Town/County
Site plan review requirements	NA	Town/County
Capital improvements plan	NA	Town/County
Economic development plan	NA	Town/County
Local emergency operations plan	NA	Town/County
Other special plans	No	
Flood insurance study or other engineering study for streams	NA	Town/County
Elevation certificates (for floodplain development)	NA	Town/County

K.6.2 Administrative/Technical Mitigation Capabilities

Table K-6 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table K-6 Foothills Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	County	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	County	
Resiliency Planner	No		
Transportation Planner	Yes		
Planner/engineer/scientist with an understanding of natural hazards	Yes	County	
Personnel skilled in GIS	Yes	County	
Full time building official	Yes	Part Time Fire Marshall	
Floodplain manager	Yes	County	
Emergency manager	Yes	County	
Grant writer	Yes	Fire Chief	
Other personnel	Yes		

Personnel Resources	Yes/No	Department/Position	Comments
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	County	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	County	

K.6.3 Fiscal Mitigation Capabilities

Table K-7 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table K-7 Foothills Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	No	No	
Capital improvements project funding	No	No	
Authority to levy taxes for specific purposes	No	No	
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	No	No	
Incur debt through general obligation bonds	No	No	
Incur debt through special tax bonds	No	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	
Other	No	No	

K.6.4 Mitigation Outreach and Partnerships

Table K-7 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table K-8 Foothills Fire Protection District Education and Outreach Capabilities

Resources	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	No
Firewise	No
StormReady	No

K.6.5 Opportunities for Enhancement

Based on the capability assessment, FFPD has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the District to expand or improve on these policies and programs to further protect the community.

K.7 Plan Implementation and Maintenance

The Foothills Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

K.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Foothills Fire Protection District did not participate in or adopt the 2016 Plan.

K.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Fire Chief of Foothills Fire Protection District will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Fire Chief will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

K.8 Mitigation Strategy

The Foothills Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District did not have any mitigation actions in the 2016 Plan. They have developed two new actions for 2021.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation

Table K-9 Foothills Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Foothills Fire 1	Mt. Vernon Fuel Break Treatment Expansion. Mt. Vernon Country Club has created a fire break behind the Mt. Vernon Community. This involved mitigating the space below the high tension lines that run east to west through our district. This is our last line of defense from the north before a wildfire can enter the Mt. Vernon community and the rest of our fire district to the south. The fire break can be expanded and extended to the Cody Park community to the east and the Lower Moss Rock community to the west. These are our two most vulnerable and dangerous areas of our fire district in regard to wildfire as they are both one way in and one way out neighborhoods. See page 51 in our 2021 CWPP.	Wildfire	2,3; S&S, ENG	Foothills Fire Protection District; Jefferson County	\$10,000 - \$100,000; Grants	High	2022-2025	New in 2021
Foothills Fire 2	Tree Mitigation Near Evacuation Routes. There are many concerns with the number of trees encroaching on roadways that would be main evacuation routes from our fire district in the event of a wildfire. These trees are likely to fall and prevent evacuation in the event of a fire. There have been many instances in other states where the community is unable to evacuate in an emergency due to roads becoming impassable. Clearing the trees that line these important evacuation routes will increase the likelihood that we can evacuate as many people as possible in the minimum amount of time.	Wildfire	1,2,3; S&S, TRN	Foothills Fire Protection District; Jefferson County	\$100,000 - \$1,000,000; Grants	High	2022-2030	New in 2021



Annex L. Genesee Fire Protection District

L.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. Genesee Fire Protection District (GFPD) was a new participant during the 2021 update process. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

L.2 Community Profile

The Genesee Fire Protection District (GFPD) is located just west of Denver at an elevation of 7,800 feet. GFPD includes the communities of Genesee, Genesee Village, and Chimney Creek, and the Genesee Business District and Genesee Town Center. Genesee Fire Rescue (GFR), the operational arm of GFPD, was founded in 1973. GFR is a combination (Paid/Volunteer) organization providing fire protection services and emergency medical services to our residents 24 hours a day, 7 days a week. GFR has approximately 35 Volunteer Firefighters and 3 Full Time Firefighters.

Genesee Fire Rescue serves a community of approximately 4,000 people within a four square mile area comprised of approximately 1,500 homes, 28 commercial buildings and 1,200 acres of open space. GFR operates an Engine Company, Truck Company, Wildland Urban Interface (WUI) Engine Company, and a brush truck. In addition, we provide basic life support in conjunction with the Highland Rescue Team Ambulance District.

Genesee Fire Rescue is a Colorado Special District and is governed by the elected board of the Genesee Fire Protection District. The Genesee Fire Protection District service area is displayed in Figure L-1.

L.2.1 Growth and Development Trends

The Genesee Fire Protection District is experiencing modest growth, with approximately 10-20 new single-family residences being built each year. The area is also seeing a pronounced change in demographics from older to younger residents with families.

L.3 Hazard Identification and Risk Summary

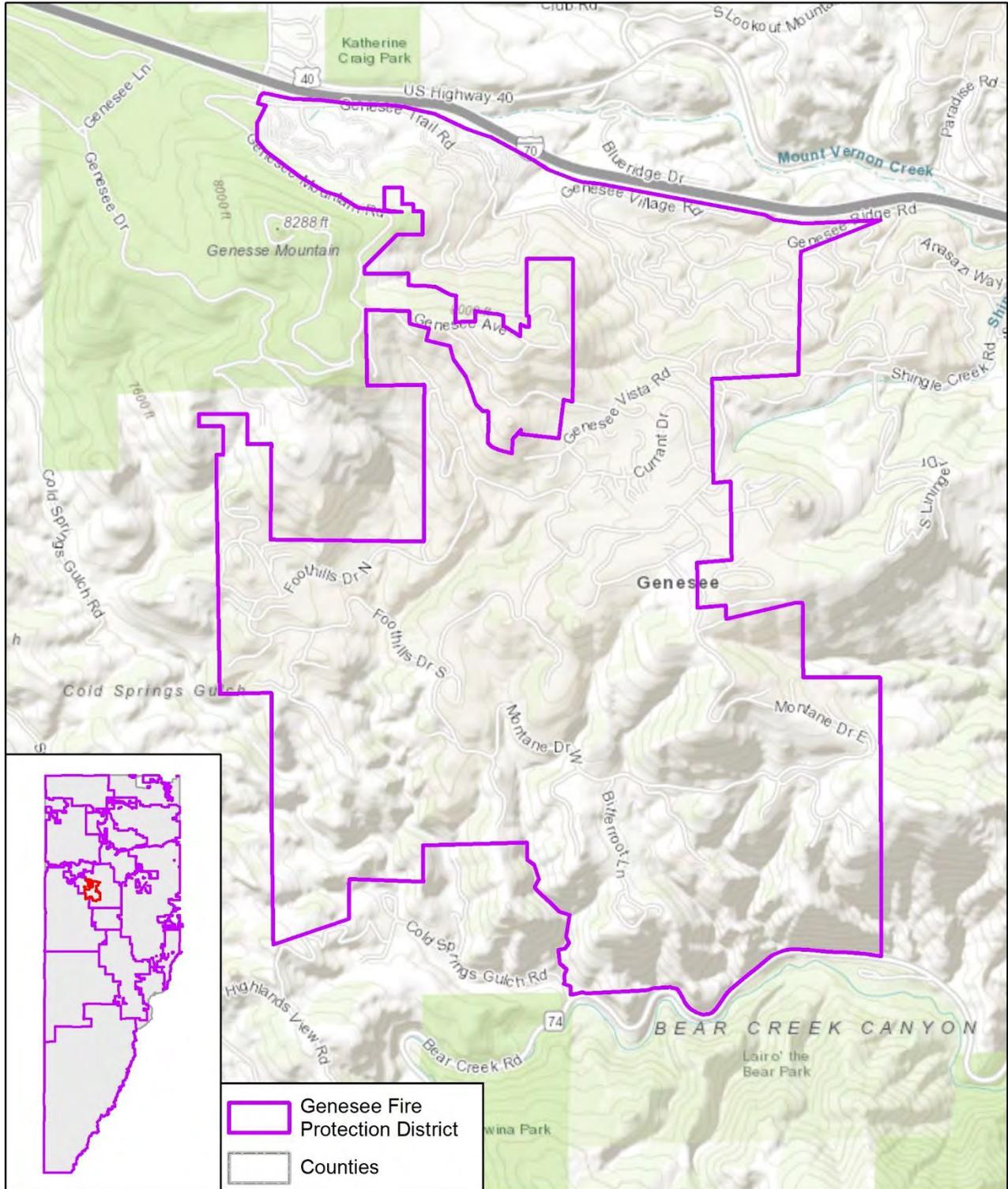
A hazard identification and vulnerability analysis was completed for the Genesee Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County. Table L-1 summarizes Genesee Fire Protection District's hazards. For the 2015 plan update, the Genesee Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table L-1 is based on Genesee Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Genesee Fire Protection District are hailstorm, lightning, severe winter storms and wildfire.



Figure L-1 Genesee Fire Protection District Service Area



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT



Table L-1 Genesee Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Limited	Occasional	Limited	Medium
Drought	Extensive	Likely	Critical	Medium
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Limited	Likely	Limited	Low
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Limited	Medium
Hailstorm	Significant	Likely	Critical	High
Landslide, Debris flow, Rockfall	Limited	Likely	Negligible	Medium
Lightning	Limited	Highly Likely	Limited	Medium
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Low
Tornado	Limited	Likely	Limited	Medium
Wildfire	Extensive	Highly Likely	Catastrophic	High
Windstorm	Significant	Likely	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



L.4 District Asset Inventory

Table L-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table L-2 Critical Facilities within District Boundaries

FEMA Lifeline	CF Type	Count
Communications	Land Mobile Private Towers	6
Food, Water, Shelter	Wastewater Plant	1
Hazardous Material	Tier II	1
Safety and Security	Fire Station	1
Transportation	Bridge	1

Source: HIFLD and CERC

Table L-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table L-3 Genesee Fire Protection District Assets

Name of Asset	Address	Replacement Value (\$)	Occupancy/ Capacity #**	Hazard Specific Vulnerability
Genesee Fire One Station	23455 Currant Drive Golden, CO 80401	\$2,000,000	50	Fire, wind, flooding, terrorism

Source: HMPC

L.5 Vulnerability Assessment

The intent of this section is to assess the District’s vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the Genesee Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District’s risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

L.5.1 Dam Incidents/Failure

There are no high or significant hazard dam inundation risk in the Genesee Fire Protection District. However, there is an earthen dam, the failure of which could impact Bear Creek and potentially the Town of Morrison as well as disrupting the potable water supply for a period of time



L.5.2 Flood

As shown in Figure 4-35 in the Base Plan, Genesee Fire Protection District has limited exposure to flood risk, with no critical facilities in mapped floodplains.

L.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the Genesee Fire Protection District.

L.5.4 Wildfire

As shown in Figures 4-49 through 4-43, Genesee Fire Protection District does have exposure to wildfire risk, including significant WUI risk. There are a total of seven critical facilities at risk to wildfire (Table L-4) or 70% of the total critical facilities within the District. A majority of the critical facilities are exposed to high (5) or moderate (2) wildfire risk.

Table L-4 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
0	0	2	5	0	7	70%

Source: HFLID and CERC

L.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

L.6 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.

L.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table L-5 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Genesee Fire Protection District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table L-5 Genesee Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	Updated in 2021
General or Comprehensive plan	No	
Zoning ordinance	No	
Subdivision ordinance	No	
Growth management ordinance	No	
Floodplain ordinance	No	
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	
Building code	No	
Fire department ISO rating	No	
Erosion or sediment control program	No	



Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Stormwater management program	No	
Site plan review requirements	No	
Capital improvements plan	No	
Economic development plan	No	
Local emergency operations plan	No	
Other special plans	No	
Flood insurance study or other engineering study for streams	No	
Elevation certificates (for floodplain development)	No	

L.6.2 Administrative/Technical Mitigation Capabilities

Table L-6 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table L-6 Genesee Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	No		
Planner/engineer/scientist with an understanding of natural hazards	Yes		Wildfire Specialist, new position
Resiliency Planner	No		
Transportation Planner	No		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No		
Personnel skilled in GIS	No		
Full time building official	No		
Floodplain manager	No		
Emergency manager	No		
Grant writer	No		
Other personnel	No		
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes		GIS Complete for FPD, New 2021
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	JeffComm Dispatch	

L.6.3 Fiscal Mitigation Capabilities

Table L-7 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table L-7 Genesee Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	No	No	
Capital improvements project funding	No	No	



Financial Resources	Accessible/Eligible to Use (Yes/No)	Has Been Used for Mitigation in the Past?	Comments
Authority to levy taxes for specific purposes	Yes	Yes	Increased mil levy in 2018
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	No	No	
Incur debt through general obligation bonds	No	No	
Incur debt through special tax bonds	No	No	
	No	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	

L.6.4 Mitigation Outreach and Partnerships

Table L-8 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table L-8 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Yes – Hired full-time public education – Wildfire Specialist
Firewise	Yes
StormReady	No

L.6.5 Opportunities for Enhancement

Based on the capability assessment, Genesee FPD has several existing mechanisms in place that already help to mitigate hazards. Continuing to expand the education and involving more stakeholders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs. Grant funding and, possibly, future mill levy adjustment to fund mitigation and operational initiatives to be considered.

L.7 Plan Implementation and Maintenance

The Genesee Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

L.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Genesee Fire Protection District did not participate in or adopt the 2016 Plan. However the 2016 HMP was referenced during the 2021 CWPP update.

L.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The GFPD Fire Chief will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The GFPD Wildland Specialist will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.



The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

L.8 Mitigation Strategy

The Genesee Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District did not have any mitigation actions in the 2016 Plan. They have developed one new action for 2021.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table L-9 Genesee Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Genesee Fire 1	<p>Emergency Evacuation Egress. According to the 2020 Wildfire Risk to Communities analysis by the U.S. Forest Service, populated areas in the Genesee Fire Protection District has a greater risk than 97% of communities in Colorado in terms of potential damage from wildfires (USFS 2020). Under 90th percentile fire weather conditions, 13% of the 56 miles of roads, private drives, and driveways in the Genesee Fire Protection District could potentially experience non-survivable conditions during wildfires (i.e., flame lengths over 8 feet). This percentage rises to 31% of roads, private drives, and driveways under 97th percentile fire weather conditions. GFPD is effectively a one way in and one way out community due to a bottleneck in the northern portion of the district that if compromised/blocked would eliminate the only emergency evacuation access for more than 2,000 Coloradans. Solution: Construction of a southern egress route from the southern portion of the district to Hwy 74. This emergency evacuation roadway would reduce evacuation times and, if needed, provide an alternative evacuation route if the primary egress in the north was compromised.</p>	Wildfire	1, 2, 3; S&S, Trans, H&M	Genesee FPD; Jefferson County Planning & Zoning	\$100,000- \$1,000,000; Partnership with Jefferson County Planning and Zoning, grants, local HOAs, and mill levy initiative	High	2023	New in 2021



Annex M. Golden Gate Fire Protection District

M.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. Golden Gate Fire Protection District fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section M.6. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

M.2 Community Profile

The Golden Gate Fire Protection District serves 1,200 Colorado people living in 500 homes in an area of 50 square miles. The District also serves various recreation areas including Centennial Cone Open Space Park, White Ranch Open Space Park, and Colorado Department of Wildlife lands. The Department is all-volunteer, consisting of a part-time fire chief and volunteer professionals. The Department operates three stations with three engines, two brush units, two water tenders, and one EUV.

The Golden Gate Fire Protection District service area is displayed in Figure M-1. Social Vulnerability scores for the District can be seen in Figures 2-2 through Figure 2-6 in Section 2 of the Base Plan. Generally, the District ranks low or below average on each of the social vulnerability categories. The District is home to a high population of senior adults. Evacuation of some residents will be required in an emergency, which poses a potential challenge in winter weather with difficult access, steep incline and native surface roads. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

M.2.1 Growth and Development Trends

Growth is limited as most land is privately held. There are only 4 non-residential properties which include the 3 fire stations and public grange building. There is limited subdividing of land for development. There is also augmentation of parkland by Jefferson County Open Space including White Ranch Park, Centennial Cone Park and the recently purchased Douglas Mountain open space of 964 acres.

The District has experienced growth including the purchase of a third fire station and engine and concerted firefighter recruitment efforts. In addition, Golden Gate FPD has installed new VHF radio repeater to facilitate communication.

M.3 Hazard Identification and Risk Assessment

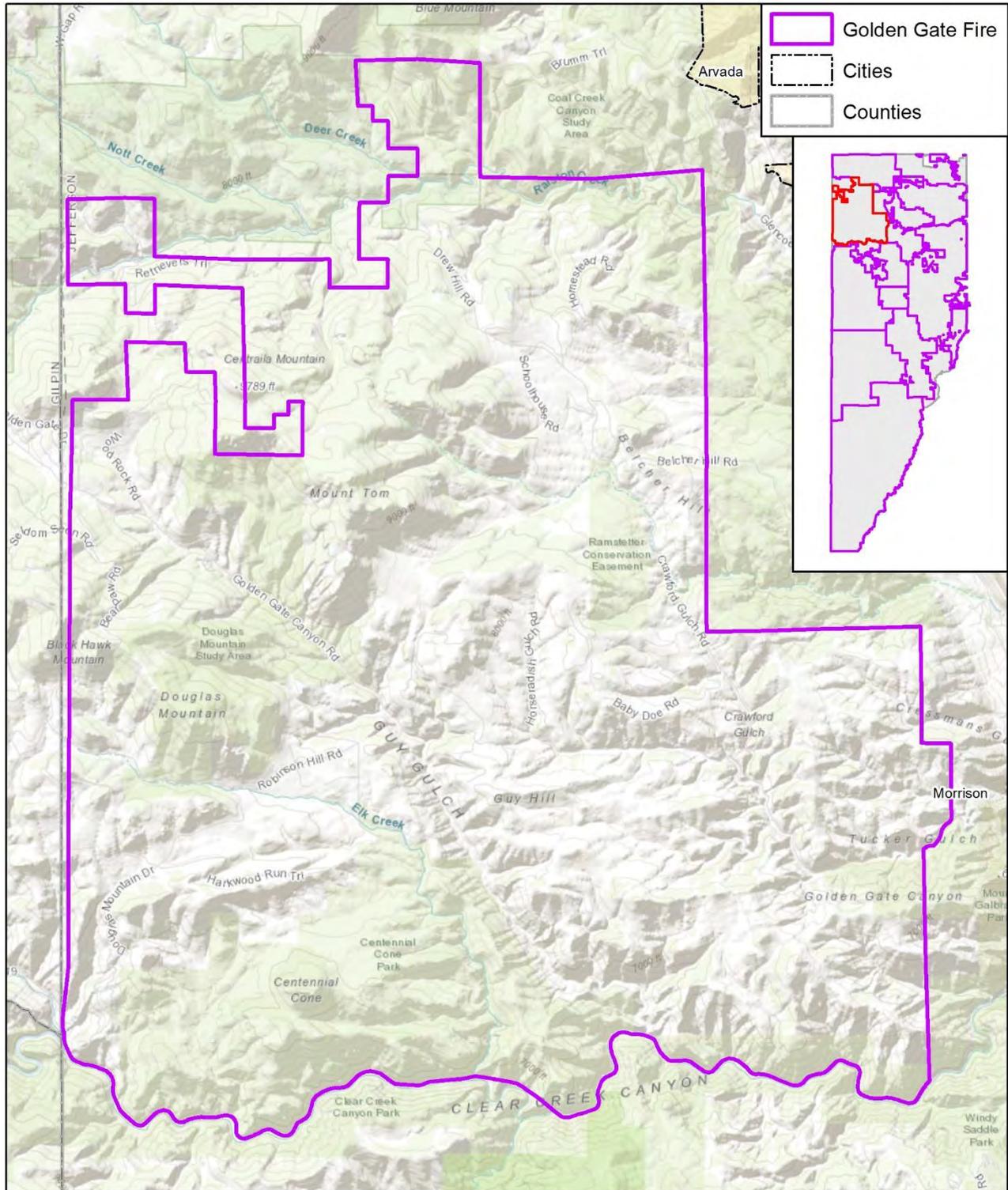
A hazard identification and vulnerability analysis was completed for Golden Gate Fire District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County. Table M-1 summarizes Golden Gate Fire District's hazards based on input provided during the planning and data collection process.

The hazard significance listed in Table M-1 is based on Golden Gate Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this, the most significant hazards for the Golden Gate Fire Protection District are dam failure, flood, hailstorm, severe winter storm, and wildfire.



Figure M-1 Golden Gate Fire Protection District Service Area



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

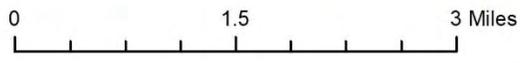




Table M-1 Golden Gate Fire Protection District – Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Occasional	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Negligible	Unlikely	Negligible	Low
Drought	Extensive	Likely	Limited	Medium
Earthquake	Significant	Unlikely	Limited	Low
Erosion and Deposition	Significant	Likely	Limited	Medium
Expansive Soils	Limited	Unlikely	Limited	Low
Extreme Temperatures	Extensive	Highly Likely	Negligible	Low
Flood	Limited	Unlikely	Limited	Low
Hailstorm	Significant	Likely	Limited	Medium
Landslide, Debris flow, Rockfall	Significant	Highly Likely	Limited	High
Lightning	Significant	Highly Likely	Limited	High
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Extensive	Highly Likely	Limited	Medium
Subsidence	Negligible	Unlikely	Negligible	Low
Tornado	Negligible	Unlikely	Limited	Low
Wildfire	Extensive	Highly Likely	Critical	High
Windstorm	Extensive	Highly Likely	Negligible	Low
<p>Geographic Extent</p> <p><u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences</p> <p><u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences</p> <p><u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences</p> <p><u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity</p> <p><u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.</p> <p><u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.</p> <p><u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.</p> <p><u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences</p> <p><u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.</p> <p><u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.</p> <p><u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years</p> <p><u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance</p> <p><u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.</p> <p><u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating.</p> <p><u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



M.4 District Asset Inventory

Table M-2 lists the critical facilities within District boundaries organized by FEMA Lifeline and critical facility type.

Table M-2 Critical Facilities within District Boundaries

Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	24
	Microwave Service Towers	1
Hazardous Materials	Tier II	1
Safety and Security	Fire Station	2
Transportation	Bridge	3
	Government Facility	1
Total		31

Source: HFILD and CERC

Table M-3 lists additional critical facilities and other community assets identified by the HMPC as important to protect in the event of a disaster. This table lists all assets within the District boundaries, not just District owned or maintained assets.

Table M-3 Golden Gate Fire Protection District Community Assets

Name of Asset	Address	Replacement value	Vulnerabilities
Fire Station #1	32360 Robinson Hill Rd. Golden, CO 80403	\$1,000,000	Wildfire
Fire Station #2	7181 Crawford Gulch Rd. Golden, CO 80403	\$1,000,000	Wildfire
Fire Station #3	25231 Golden Gate Canyon RD. Golden, CO 80403	\$200,000	Wildfire
Repeater Tower	Guy Hill	\$150,000	Wildfire
Microwave Tower	Harkwood Run Road	\$300,000	Wildfire

Source: HMPC

M.5 Vulnerability Assessment

The intent of this section is to assess Golden Gate Fire District's vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see Risk Assessment.

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 provides a refined vulnerability assessment, specific for the Golden Gate Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District's risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado



M.5.1 Dam Incidents/Failure

Figure 4-7 in Section 4.3.3 of the Base Plan shows potential dam inundation areas in the Golden Gate Fire Protection District, primarily along Clear Creek in the southern portion of the District's boundaries. There are a number of high hazard potential dams upstream of the District exposing 1 critical facility, a bridge. Refer to Section 4.3.3 of the Base Plan for dam inundation analysis for Jefferson County.

M.5.2 Flood

Past Events

Flash Flood - June 27, 2004: A deluge of very heavy rain from nearly stationary thunderstorms caused flooding and flash flooding problems over parts of Jefferson County. In Jefferson County, an automated rain gauge north of Golden measured 3.6 inches of rain in one hour. Numerous homes were flooded in Golden, including one that was 146 years old. The home was listed as a complete loss. In addition, State Highway 93 had to be closed from the Pine Ridge subdivision (near 6th Ave and Hwy 93) to Golden Gate Canyon Road. At the height of the storm, about 4 feet of water covered Colorado 93 through Golden, forcing its temporary closure. Rockfall and debris flows were also reported in Golden Gate Canyon.

Estimating Losses

Figure 4-34 and Figure 4-35 in Section 4.3.9 of the Base Plan shows the flood hazard areas within the District and the structures located within the 1% annual flood chance and 0.2% annual flood chance zones. There are structures within the 0.2% annual flood chance primarily along Clear Creek, Ralston Creek and Tucker Gulch. There are no identified critical facilities in mapped floodplains. The overall significance of this hazard for the District is medium.

M.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the Golden Gate Fire Protection District.

M.5.4 Wildfire

Past Events

Elk Creek Fire - May 14-15, 1991: The Elk Creek fire in the Golden Gate FPD burned 102 acres. The steep terrain with limited access led to the use of hand crews formed from 80+ firefighters from 15 departments and ranging across multiple counties. The fire was managed jointly by the FPDs and the Jefferson County Sheriff's Office's newly formed Incident Management Group (IMG).

Centennial Cone Fire - July 21-23, 2006: The Centennial Cone fire burned in the no-man's land adjacent to the Golden Gate FPD. The fire, which burned 22 acres, remained entirely contained within the open space park. However, the significant fire activity in steep terrain with no road access during the height of the 2006 national fire season limited the initial attack. The fire threatened U.S. Highway 6 in Clear Creek Canyon and those subdivisions. Limited air resources helped slow the spread of the fire, and an interagency "hotshot" hand crew supplemented local fire resources on the second day for a direct attack. Summer monsoons helped reduce fire danger on day three as the fire was controlled.

Indian Gulch Fire - March 20-25, 2011: The Indian Gulch Fire started on March 20, 2011 in the area of Mount Galbraith, between Clear Creek Canyon and Golden Gate Canyon, 0.5 miles West of Golden, Colorado and burned 1,570 acres. The fire was 100% contained on March 25, 2011.

Estimating Potential Losses

Golden Gate Fire Protection District does have exposure risk to wildfire both in terms of critical facilities and parcels/structures in WUI communities. As shown in Figures 4-49 through 4-54 in the Base Plan, there are a number of areas in the District at risk of wildfire, although the risk is not as extreme as in many of the surrounding Districts. The District does have a history of both direct and indirect impacts from wildfires.

According to the GIS based analysis of wildfire, Arvada FPD has a total of 30 critical facilities at risk to wildfire (Table M-4), mostly at moderate to low risk; this represents 94% of the total critical facilities within the District.



Table M-4 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
0	6	22	2	0	30	94%

Source: HFLID and CERC

M.6 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.

M.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table M-5 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Golden Gate Fire. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table M-5 Golden Gate Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	2011
General or Comprehensive plan	County	
Zoning ordinance	County	Unincorporated Jefferson County
Subdivision ordinance	Yes	Limited small HOA's for informational purpose only
Growth management ordinance	No	
Floodplain ordinance	County	
Floodplain Management Plan	NO	
Other special purpose ordinance (stormwater, steep slope, wildfire)	County	
Building code	Yes	2015 IFC code
Fire department ISO rating	Yes	ISO 6 within 5 mi. of FD, ISO 10 if over 5 mi.
Erosion or sediment control program	No	
Stormwater management program	No	
Site plan review requirements	Yes	County
Capital improvements plan	Yes	County
Economic development plan	No	
Local emergency operations plan	No	
Community Wildfire Protection Plan (CWPP)	Yes	2011 CWPP
Other special plans	No	
Flood insurance study or other engineering study for streams	No	
Elevation certificates (for floodplain development)	No	
Other	Yes	Burn permits, driveway inspection, residential sprinkler system plan review

M.6.2 Administrative/Technical Mitigation Capabilities

Table M-6 identifies the personnel responsible for activities related to mitigation and loss prevention for Golden Gate Fire Protection District.



Table M-6 Golden Gate Fire District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	County	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	County	
Planner/engineer/scientist with an understanding of natural hazards	Yes	County	
Personnel skilled in GIS	Yes	County	
Resiliency Planner	No		
Transportation Planner	Yes	County	
Full time building official	Yes	County	
Floodplain manager	Yes	County	
Emergency manager	Yes	County	
Grant writer	No		
Other personnel	Yes	Fire Board and Fire Chief	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	County	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	County	
Other			

M.6.3 Fiscal Mitigation Capabilities

Fiscal mitigation capabilities are financial tools or resources that Golden Gate Fire District could or already does use to help fund mitigation activities. Table M-7 lists the fiscal mitigation capabilities available to Golden Gate Fire District.

Table M-7 Golden Gate Fire District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has been used to fund Mitigation in the Past?	Comments
Community Development Block Grants	No	No	
Capital improvements project funding	Unknown	No	Verify with County
Authority to levy taxes for specific purposes	No	No	Only by taxpayer vote
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	No	No	
Incur debt through general obligation bonds	No	No	
Incur debt through special tax bonds	No	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	
Stormwater Service Fees	No	No	
Other			



M.6.4 Mitigation Outreach and Partnerships

Table M-8 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table M-8 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	No
Firewise	Yes. Annual community workshops and public education
StormReady	No
Other?	Annual JeffCo Slash Collection Day event for Golden Gate community. 2020 marked 2 nd year held and with record slash collection: >800 cubic yards collected.

M.6.5 Opportunities for Enhancement

Based on the capability assessment, Golden Gate FPD has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the District to expand or improve on these policies and programs to further protect the community. Wildfire mitigation is the biggest opportunity the district has to help protect this community from a large wildfire. Rockfall mitigation along Golden Gate Canyon Road would help reduce the risk of a large rock fall during heavy rains.

M.7 Plan Implementation and Maintenance

The Golden Gate Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

M.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

This Golden Gate FPD did not incorporate the 2016 Hazard Mitigation Plan into their planning mechanisms but acknowledges the importance of risk information. Moving forward the District plans to look for ways to integrate the 2021 Hazard Mitigation Plan into future planning efforts.

M.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The Golden Gate FPD Chief will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Golden Gate FPD Chief will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilizing marketing and communications to get information to citizens and businesses.

M.8 Mitigation Strategy

The Golden Gate Fire District Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.



The District had two mitigation actions in the 2016 Plan, and has not completed either of them. Those actions have been carried over into the 2021 Plan, along with one new action.

Additionally, a 2019 grant from the U.S. Forest Service in conjunction with matching funds from local residents provided fire mitigation to north Douglas Mountain Drive area residents.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table M-9 Golden Gate Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Golden Gate Fire 1	Public Education on Wildfire Mitigation and Firewise Workshop. Continued education for the community in the effort to mitigate wildfire hazards. Outreach through community emails, newsletters, and workshops. Education of what steps to be taken for mitigation and prevention	Wildfire	1,2	Golden Gate Fire District	Low other than volunteers' time Mainly through donations of both time and dollars.	High	Ongoing with monthly / yearly topics	Annual Implementation Continue public education Firewise workshops.
Golden Gate Fire 2	Improve Wildland Fire Resources. Working with a 100% volunteer department requires continued efforts to add resources to the department and community. Recruit/retain firefighters, acquire new equipment, add 3rd fire station, additional cisterns, FEMA fire mitigation grant. Resources will affect the responsiveness of the department. Additional Fire Fighters will spread individuals across the district adding new skills. Equipment, Stations, and Cisterns add more ability to respond and minimize risk and damage from emergency events.	Wildfire	2,3	Golden Gate Fire District	TBD on a case by case basis Through continued donation efforts and drives, along with application and grant awards	High	Ongoing	Annual Implementation 1. Purchase of a 3rd fire station and engine and plans for station upgrade to house shift FFs. 2. Formed a Study Group to investigate best practices of other rural mountain fire departments. 3. Concerted firefighter recruitment efforts. (3 new recruits in 2020). 4. Installed VHF radio repeater system to improve communication in the district and backcountry.
Golden Gate Fire 3	Annual Slash Collection Day. Community fuel reduction	Wildfire;	2; S&S;	Golden Gate Fire Protection District; Jefferson County/ Chipping Program, Golden Gate Grange	Volunteer firefighter staff-hours, Grange provides use of their property/ facility and donates food/drinks	High	Annual	New in 2021.



Annex N. Indian Hills Fire Protection District

N.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The Indian Hills Fire Protection District fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section A.9. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan

N.2 Community Profile

Indian Hills is a census-designated place (CDP) and a U.S. Post Office in Jefferson County, Colorado. The population was 1,398 according to 2019 census estimates. According to the United States Census Bureau, the CDP has a total area of 4.7 square miles, all of it land.

The Indian Hills Fire Protection District service area is displayed in Figure N-1. Social Vulnerability scores for the District can be seen in Figures 2-2 through Figure 2-6 in Section 2 of the Base Plan. Generally, the District ranks low on each of the social vulnerability categories except for the housing and transportation vulnerability category, in which the District ranks above average. The household composition and disability category is below average vulnerability as well. For more discussion of Social Vulnerability, see Section 2.3 of the Base Plan.

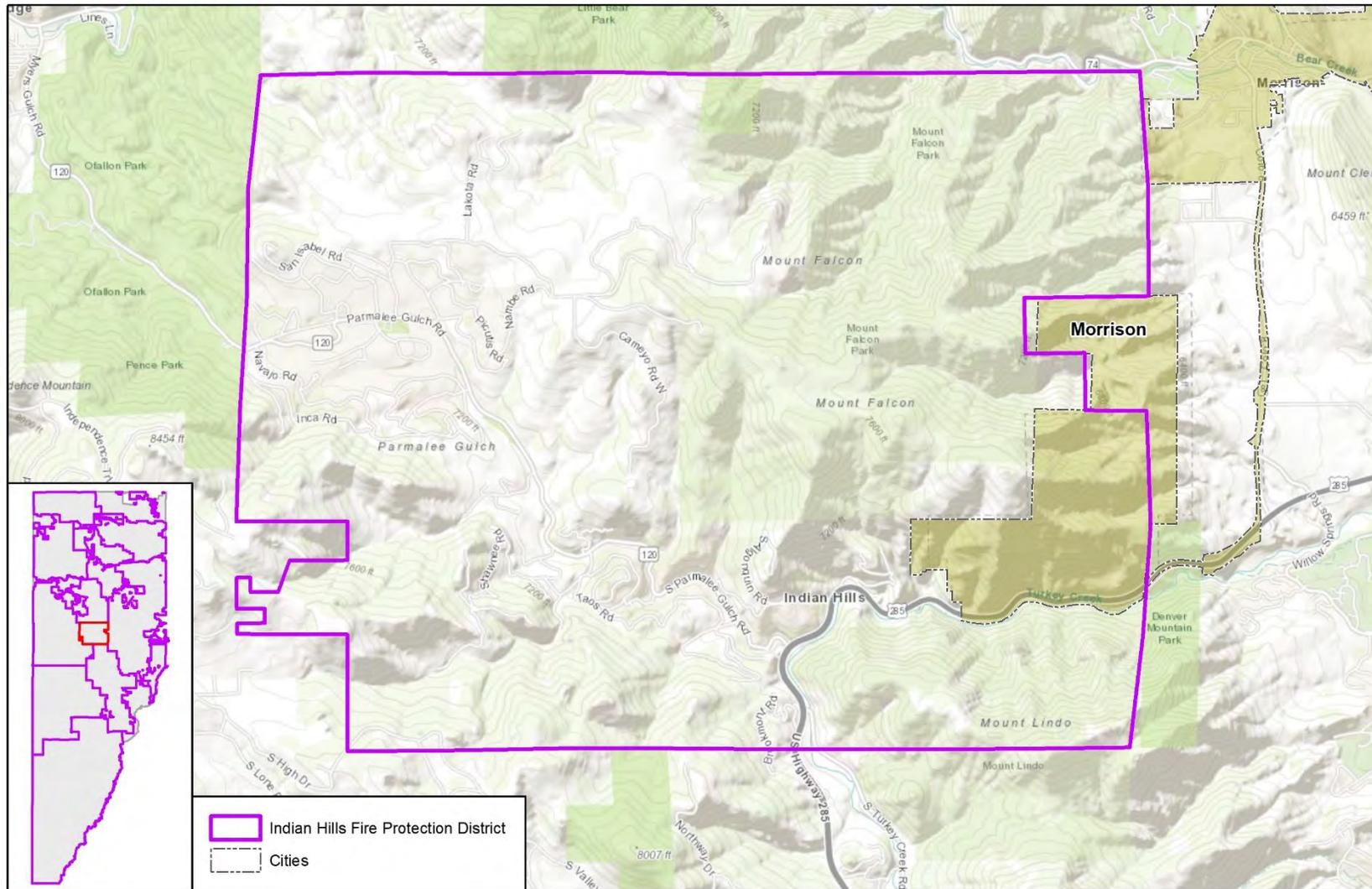
N.2.1 Growth and Development Trends

Maintaining the mountain community character of Indian Hills is a primary concern of residents. New development, both commercial and residential, needs to be well planned and designed in order to meet the unique and sometimes restrictive environment of the mountains. An issue of particular concern is platting. Many of the areas in Indian Hills were platted in the 1920's and 1930's. These plats created individual lots, many of which are as small as 50' x 50' in size. As individual lots, they do not meet current buildable standards for septic/leach fields or setbacks. The consequences of continuing to allow building on these old plats in the mountains are the obvious continued degradation of water supplies, increased population in the Wildland Urban Interface, and overcrowding of County and community roads. Features that make Indian Hills unique are its open space, visual resources, historic sites, rural character, and abundance of wildlife. New development in Indian Hills needs to take all of these characteristics into consideration in order to plan wisely for the future.

The Indian Hills Community Plan guides the land use rules and regulations for the Indian Hills Community. General land use recommendations take into consideration forest health and fire mitigation practices. With adoption of the updated Jefferson County Comprehensive Master Plan in 2020, a new area plan for Indian Hills was incorporated into the County plan, which applies to land use proposals. Specific policies in the Community Plan are still applicable, but general policies in the Comprehensive Master Plan now take precedent over the general policies in the Community Plan.



Figure N-1 Indian Hills Fire Protection District Service Area



wood. Map compiled 2/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

0 1 2 Miles





N.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the Indian Hills Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction and special district was in support of the main hazard summary identified in the base plan; however, the hazard summary for each annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the District's risk and vulnerabilities from that of the overall County. Figure N-1 summarizes Indian Hills Fire Protection District's hazards. For the 2021 plan update, the Indian Hills Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Figure N-1 is based on Indian Hills Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Indian Hills Fire Protection District are hailstorm, lightning, severe winter storms and wildfire.



Table N-1 Indian Hills Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Unlikely	Limited	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Unlikely	Limited	Negligible	Low
Drought	Likely	Extensive	Limited	Medium
Earthquake	Unlikely	Extensive	Catastrophic	Low
Erosion and Deposition	Occasionally	Significant	Limited	Low
Expansive Soils	Unlikely	Limited	Negligible	Low
Extreme Temperatures	Likely	Extensive	Limited	Medium
Flood	Occasionally	Limited	Limited	Medium
Hailstorm	Likely	Extensive	Negligible	High
Landslide, Debris flow, Rockfall	Occasionally	Limited	Negligible	Medium
Lightning	Highly Likely	Extensive	Negligible	High
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Highly Likely	Extensive	Limited	High
Subsidence	Occasionally	Significant	Negligible	Low
Tornado	Unlikely	Extensive	Catastrophic	Low
Wildfire	Highly Likely	Extensive	Catastrophic	High
Windstorm	Likely	Extensive	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



N.4 District Asset Inventory

Table N-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table N-2 District Assets within District Boundaries

FEMA Lifeline	CF Type	Count
Communications	Land Mobile Private Towers	4
	Microwave Service Towers	2
Safety and Security	Fire Station	1
	School	1
Transportation	Aircraft Facility	2
	Bridge	4
	Government Facility	2

Source: HIFLD and CERC

Table N-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table N-3 Indian Hills Fire Protection District Assets

Name of Asset	Address	Replacement Value (\$)	Occupancy/ Capacity #	Vulnerabilities
Indian Hills Fire Station	4476 Parmalee Gulch Rd	\$2,500,000	0/50	

Source: HMPC

N.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see the Risk Assessment in Chapter 4.

N.5.1 Dam Incidents/Failure

There is no dam inundation risk in the Indian Hills Fire Protection District.

N.5.2 Flood

As shown in Figure 4-35 in the Base plan, there is significant exposure to flood risk in the District, including structures at risk along the Turkey Creek. Four critical facilities are located in the 1% floodplain: three bridges and one communications tower, as shown in Table N-4; this represents 10% of the identified critical facilities in the District.

Table N-4 Critical Facilities within District Boundaries at Risk to 1% Annual Chance Flood

Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
Transportation	Bridge	3
Total		4

Source: HIFLD and CERC

N.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the Indian Hills Fire Protection District.



N.5.4 Wildfire

Indian Hills Fire Protection District does have exposure risk to wildfire both in terms of critical facilities and parcels/structures in WUI communities. As shown in Figures 4-49 through 4-54 in the Base Plan, there are a number of areas in the District at high risk of wildfire, including significant WUI areas.

According to the GIS based analysis of wildfire, Indian Hills FPD has seven critical facilities at moderate to high risk to wildfire (Table N-5); this represents 44% of the total critical facilities within the District.

Table N-5 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
0	0	2	5	0	7	

Source: HFLID and CERC

N.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. That is the reason for the asset inventory provided in section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

N.6 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.

N.6.1 Regulatory Mitigation Capabilities

Table N-6 lists planning and land management a tool typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table N-6 Indian Hills Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	2007
General or Comprehensive plan	No	Jeffco Comp. Plan, Indian Hills Community Plan
Zoning ordinance	No	Jeffco
Subdivision ordinance	No	Jeffco
Growth management ordinance	No	Jeffco
Floodplain ordinance	No	Jeffco
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	Jeffco
Building code	Yes	Jeffco
Fire department ISO rating	Yes	6
Erosion or sediment control program	No	Jeffco
Stormwater management program	No	Jeffco
Site plan review requirements	Yes	Jeffco
Capital improvements plan	No	
Economic development plan	No	Jeffco
Local emergency operations plan	No	Jeffco



Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Other special plans	Yes	CWPP (2007)
Flood insurance study or other engineering study for streams	No	Jeffco
Elevation certificates (for floodplain development)	No	Jeffco

N.6.2 Administrative/Technical Mitigation Capabilities

Table N-7 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table N-7 Indian Hills Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	No		Jeffco
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No		Jeffco
Planner/engineer/scientist with an understanding of natural hazards	No		Jeffco
Personnel skilled in GIS	No		Jeffco
Full time building official	No	Part Time Fire Marshall	
Floodplain manager	No		Jeffco
Emergency manager	No		Jeffco
Grant writer	Yes	Fire Chief	
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	No		Jeffco
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No		Jeffco

N.6.3 Fiscal Mitigation Capabilities

Table N-8 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table N-8 Indian Hills Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	No	No	
Capital improvements project funding	Yes	No	
Authority to levy taxes for specific purposes	Yes	No	
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	Yes	No	
Incur debt through general obligation bonds	Yes	No	
Incur debt through special tax bonds	No	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	



N.6.4 Mitigation Outreach and Partnerships

Table N-9 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table N-9 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Yes-New group working on mitigation
Firewise	Yes
StormReady	No

N.6.5 Opportunities for Enhancement

Based on the capability assessment, Indian Hills FPD has several existing mechanisms in place that already help to mitigate hazards. Continuing to expand the education and involving more stake holders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs.

Opportunities exist to create a chipping assistance program, improve education of community members, practice evacuation drills, and potentially improve notification methods. In the past the department has assisted with hiring a contractor to perform curbside chipping for homeowners. Resuming a periodic program like this would help in reducing fuel load and help harden homes. We are working with a new group interested in resuming the chipping program and providing education. Evacuation remains a critical element for wildland fire and the existing Code Red system is an opt-in system with only about 30% of phones in the network opted in. We continue to work on education, but we may consider enhancing this with audible notification systems (public address system). Training and education along with practice becomes a critical element in making sure the community understand their role in life safety.

N.7 Plan Implementation and Maintenance

The Indian Hills Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

N.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Indian Hills Fire Protection District recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms.

N.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The IHFPD Fire Chief will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. the Chief will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.



N.8 Mitigation Strategy

The Indian Hills Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District had one mitigation action in the 2016 Plan, which has not been completed. That action has been carried over into the 2021 Plan, along with one new action.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table N-10 Indian Hills Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Indian Hills Fire 1	Update CWPP to reflect changing conditions and new development. Our existing CWPP was completed in 2007 and lacks the in depth fuels analysis available with current technology (LIDAR). We have budgeted to have an outside contractor begin work in 2021 and complete the work in 2022. The CWPP will assist in assessing where future work will be prioritized and completed.	Wildfire	1,2,3	Indian Hills Fire Protection District	To be determined but approximately \$ 15-40K, Grant funding – state and federal	High	2022	Not Started. Budgeted for 2021 and 2022.
Indian Hills Fire 2	Wildfire mitigation education & outreach. Work with the Indian Hills Improvement Association (IHIA) and the Indian Hills Water District (IHWD) to provide education and develop improvements in fire mitigation education, evacuation education and water management.	Wildfire;	1; 2; 3; S&S;	Indian Hills Fire Protection District; IHIA, IHWD Jefferson County Sheriff, Indian Hills Water District	\$10,000 - \$100,000 Department Budget	High	Ongoing	New in 2021



Annex O. Inter-Canyon Fire Protection District

O.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. Inter-Canyon Fire Protection District (IC FPD) was a new participant during the 2021 update process. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

O.2 Community Profile

The Inter-Canyon Fire Protection District is located southwest of Denver in the foothills of Colorado. Organized in 1956, Inter-Canyon Fire Protection District. With a first due response area of 52 square miles the firefighters of ICFPD respond to an average of 350 calls per year.

The mission of the Inter-Canyon Fire Protection District (ICFPD) is to aid in the preservation of life and property. Throughout the year, our volunteers participate and contribute to a myriad of functions related to the public safety of the citizens of the district. We invite you to explore this site to learn more about our organization. Please do not hesitate to contact us if we can be of service.

With a roster of thirty active firefighters, the department operates fifteen pieces of apparatus at five stations throughout the district. Apparatus includes five engines, two brush trucks, three water tenders, three ambulances, and two rescue trucks. The firefighters, EMTs and paramedics of ICFPD include a team of highly motivated and trained volunteer professionals. Our purpose is to respond for fire suppression, wildland fire, rescue, emergency medical calls and hazardous material emergencies.

Figure O-1 shows a map of the Inter-Canyon Fire Protection District.

O.2.1 Growth and Development Trends

Inter Canyon will have residential growth with approximately 200 new homes over the next five years. The impact will be on department resource availability with potential for increased calls, increased risk for wildfire potential and evacuations.

O.3 Hazard Identification and Risk Summary

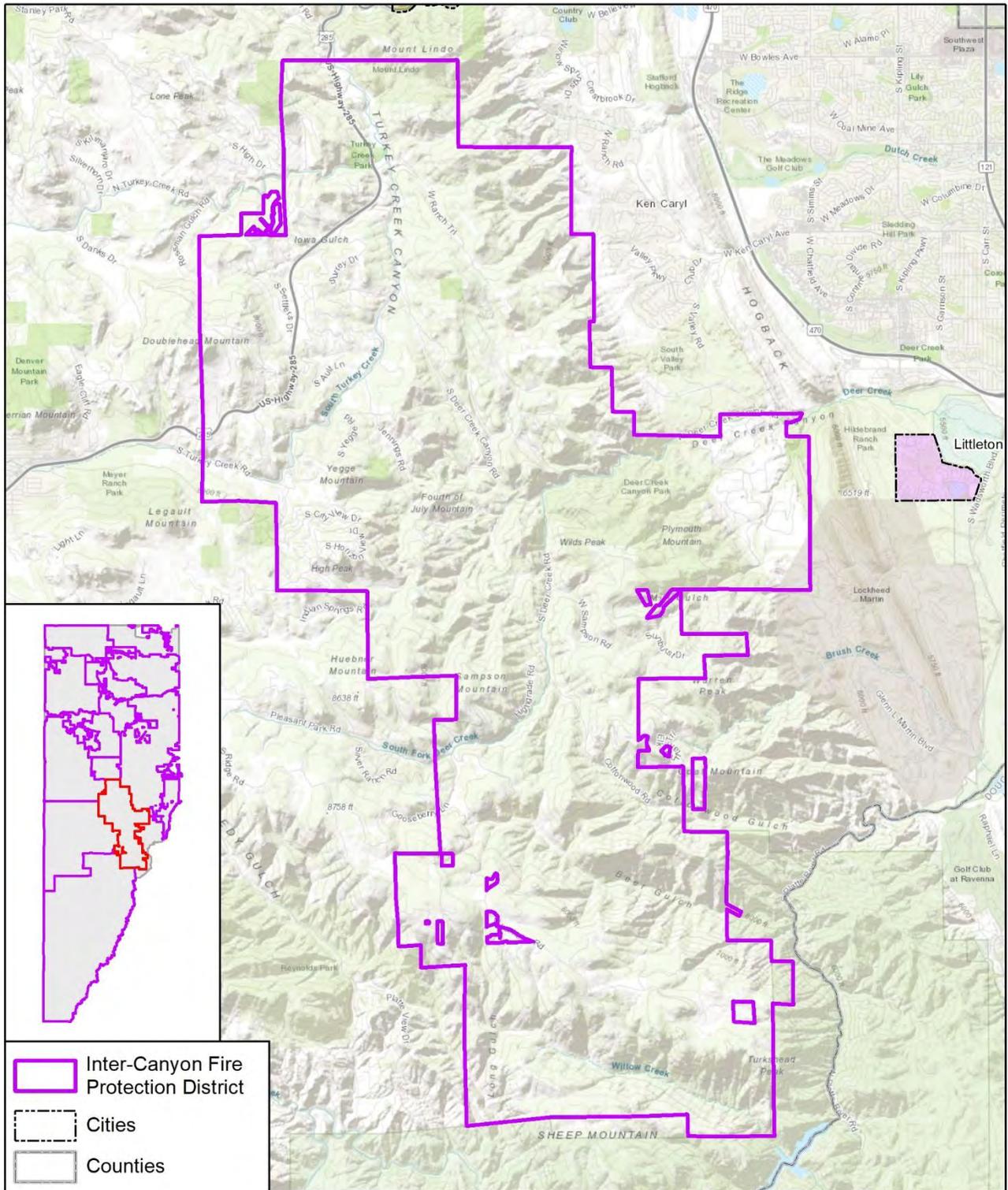
A hazard identification and vulnerability analysis was completed for the Inter-Canyon Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County. Table O-1 summarizes Inter-Canyon Fire Protection District's hazards. For the 2015 plan update, the Inter-Canyon Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table O-1 is based on Inter-Canyon Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Inter-Canyon Fire Protection District are flood, hail, pandemic, winter storm, and wildfire.



Figure O-1 Inter-Canyon Fire Protection District Service Area Service Area



Map compiled 4/2021;
intended for planning purposes only.
Data Source: Jefferson County, CDOT

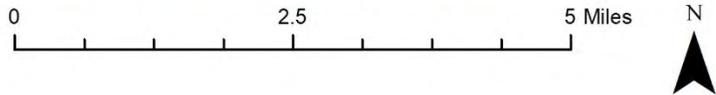




Table O-1 Inter-Canyon Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Significant	Likely	Limited	Medium
Dam Failure	Negligible	Occasional	Limited	Low
Drought	Extensive	Likely	Critical	Medium
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Moderate	Likely	Critical	Medium
Expansive Soils	Limited	Likely	Limited	Low
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Critical	High
Hailstorm	Significant	Likely	Critical	High
Landslide, Debris flow, Rockfall	Limited	Likely	Negligible	Medium
Lightning	Limited	Highly Likely	Limited	Medium
Pandemic	Extensive	Occasional	Critical	High
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Low
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Significant	Likely	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



O.4 District Asset Inventory

Table O-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table O-2 Critical Facilities within District Boundaries

FEMA Lifeline	CF Type	Count
Communications	FM Transmission	3
	Land Mobile Private Towers	12
	Microwave Service Towers	6
Energy	Electric Substation	1
Hazardous Material	Tier II	1
Safety and Security	Fire Station	5
Transportation	Bridge	13

Source: HIFLD and CERC

Table O-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table O-3 Inter-Canyon Fire Protection District Assets

Name of Asset	Address	Replacement Value (\$)	Occupancy/ Capacity #**	Hazard Specific Vulnerability
Inter-Canyon Fire One Station	4476 Parmalee Gulch Rd	\$2,000,000	B	Fire, wind, flooding, terrorism

Source: HMPC

O.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the Inter-Canyon Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District's risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

O.5.1 Dam Incidents/Failure

There is no dam inundation risk in the Inter-Canyon Fire Protection District.



0.5.2 Flood

Figure 4-34 in the Base Plan shows that the Inter-Canyon Fire Protection District has mapped 1% and 0.2% floodplains, primarily along Deer Creek. There are nine critical facilities within the 1% annual flood chance areas, all of which are bridges; there are no critical facilities in 0.2% floodplains in the District. Table O-4 shows the results of the analysis by critical facility type and FEMA Lifeline.

Table O-4 Critical Facilities within District Boundaries at Risk to 1% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Transportation	Bridge	9
Total		9

Source: HIFLD and CERC

0.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the Inter-Canyon Fire Protection District.

0.5.4 Wildfire

As shown in Figures 4-49 through 4-43, Inter-Canyon Fire Protection District does have exposure to wildfire risk, including significant WUI risk. There are a total of 30 critical facilities at risk to wildfire (Table O-5) or 73% of the total critical facilities within the District. A majority of the critical facilities are exposed to high (20) or highest (6) wildfire risk.

Table O-5 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
0	2	2	20	6	30	73%

Source: HFLID and CERC

0.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

0.6 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.

0.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table O-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 Inter-Canyon Fire Protection District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table O-6 Inter-Canyon Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	No	In progress, expected completion in 2021
General or Comprehensive plan	No	
Zoning ordinance	Yes	Working with the County on the WUI codes, Ch. 5 adoption.
Subdivision ordinance	NA	



Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Growth management ordinance	NA	
Floodplain ordinance	NA	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	WUI codes
Building code	Yes	2018
Fire department ISO rating	Yes	4/4
Erosion or sediment control program	NA	
Stormwater management program	NA	
Site plan review requirements	NA	
Capital improvements plan	Yes	Working on station replacement since 2018
Economic development plan	NA	
Local emergency operations plan	No	Work in progress with County and surrounding districts
Other special plans	No	Evacuations, work in progress
Flood insurance study or other engineering study for streams	NA	
Elevation certificates (for floodplain development)	NA	

0.6.2 Administrative/Technical Mitigation Capabilities

Table O-7 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table O-7 Inter-Canyon Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	NA		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	NA		
Planner/engineer/scientist with an understanding of natural hazards	NA		
Personnel skilled in GIS	NA		
Full time building official	NA		
Floodplain manager	NA		
Emergency manager	NA		
Grant writer	Yes		Hired in 2021
Other personnel	NA		
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	NA		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	NA		



O.6.3 Fiscal Mitigation Capabilities

Table O-8 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table O-8 Inter-Canyon Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	No		
Capital improvements project funding	Yes	Yes	working to improve communications
Authority to levy taxes for specific purposes	No		
Fees for water, sewer, gas, or electric services	No		
Impact fees for new development	No		
Incur debt through general obligation bonds	No		
Incur debt through special tax bonds	No		
Incur debt through private activities	No		
Withhold spending in hazard prone areas	No		

O.6.4 Mitigation Outreach and Partnerships

Table O-9 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table O-9 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Ambassador program, chipping program
Firewise	One Firewise community in District
StormReady	No
Other Outreach Education/Programs	Home assessments, Ready Set Go

O.6.5 Opportunities for Enhancement

Based on the capability assessment, Inter-Canyon FPD has several existing mechanisms in place that already help to mitigate hazards. Continuing to expand the education and involving more stake holders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs.

Inter Canyon is currently providing roadside chipping, wildfire prepared assessments, increasing fire response capabilities, work on several committees regarding wildfire mitigation and evacuations.

O.7 Plan Implementation and Maintenance

The Inter-Canyon Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

O.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The Inter-Canyon Fire Protection District did not participate in or adopt the 2016 Plan.



O.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The District Fire Chief will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The fire Chief will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

O.8 Mitigation Strategy

The Inter-Canyon Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District did not have any mitigation actions in the 2016 Plan. They have developed one new action for 2021.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table O-10 Inter-Canyon Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Inter Canyon Fire 1	Update CWPP. Last update was 2007 completed by the County. The new report will highlight past mitigation efforts and identify areas of high risk.	Wildfire;	1; 2; 3; H&M; COM; TRN; S&S	Inter Canyon and Elk Creek Forrest Stewards Guild, Colorado State Forrest Service	\$10,000 - \$100,000 Fire districts	High	Fall 2021	New in 2021



Annex P. North Fork Fire Protection District

P.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. North Fork Fire Protection District (NFFPD) fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section J.6. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

P.2 Community Profile

North Fork Volunteer Fire Department provides structural and wildland fire suppression, emergency medical care and transport, rescue and fire prevention services to the mountain communities of Pine Grove, Buffalo Creek, Deckers, Trumbull, Oxyoke, Nighthawk and Scraggy View. North Fork Volunteer Fire Department covers 240 square miles in Southern Jefferson and Northwest Douglas Counties in Colorado. Pike National Forest composes 80% of the District. While the number of residents in the District is approximately 1700, it is estimated that Pike National Forest has over one million people visit this division of the forest every year. North Fork Volunteer Fire Department runs three stations, one in Pine Grove, one in Buffalo Creek, and one in Trumbull. Due to the volunteers' outstanding commitment and diligence in training, the Department maintains an ISO 5 rating for all properties within 5 miles of any of the fire stations.

Figure P-1 shows the Jefferson County portion of the District.

P.2.1 Growth and Development Trends

North Fork Fire Protection District lies to the southwest of Littleton. Potential growth is limited due to intermix of private lands in the Pike National Forest. The District has seen approximately 1/3 or more of its acreage burned by wildfire in the past 10 years.

P.3 Hazard Identification and Risk Summary

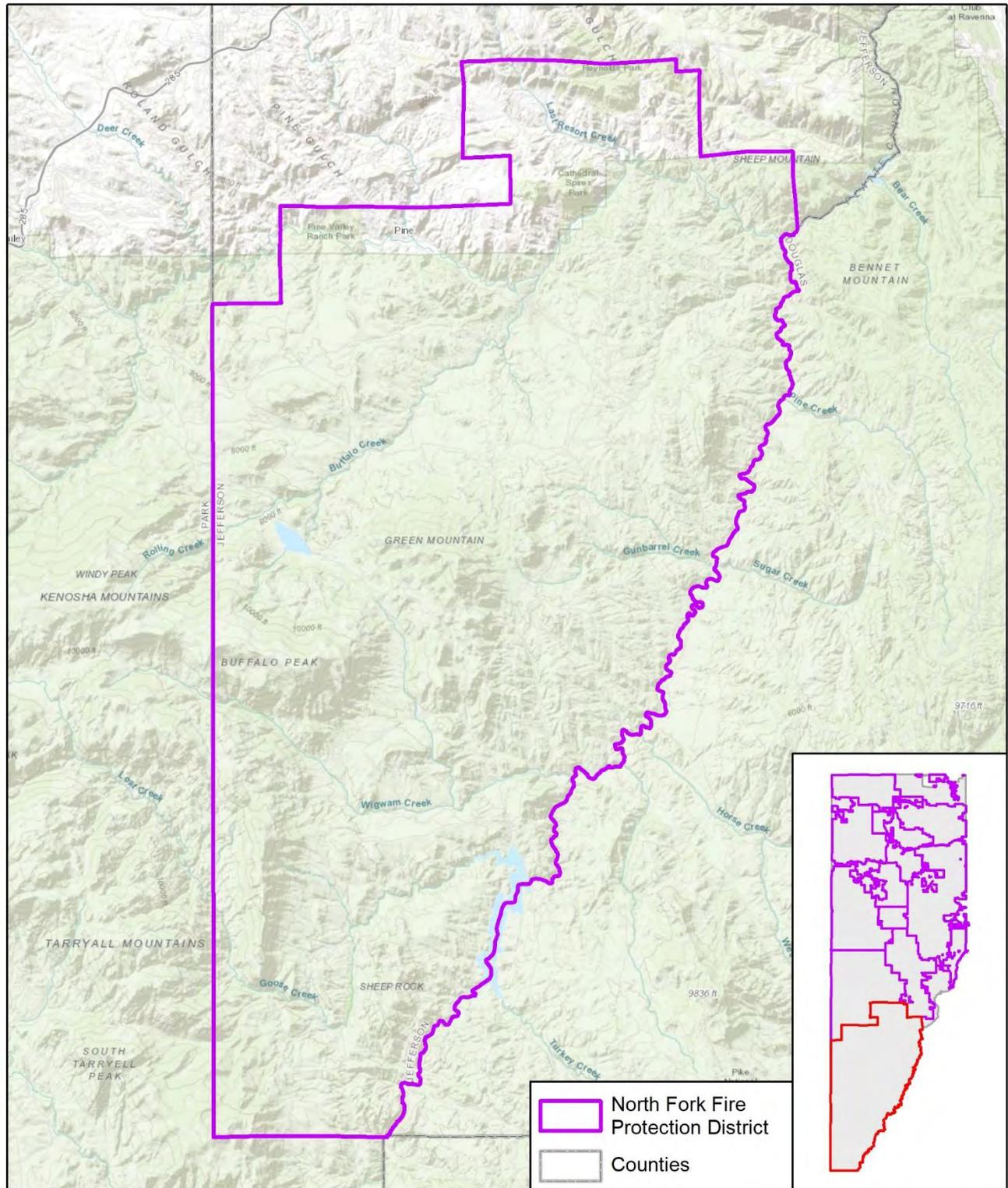
A hazard identification and vulnerability analysis was completed for the North Fork Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan; however, the hazard summary for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County. Table P-1 summarizes North Fork Fire Protection District's hazards. For the 2015 plan update, the North Fork Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table P-1 is based on North Fork Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the North Fork Fire Protection District are flood, hail, winter storm, and wildfire.



Figure P-1 North Fork Fire Protection District Service Area Service Area



Map compiled 4/2021;
intended for planning purposes only.
wood Data Source: Jefferson County, CDOT

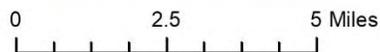




Table P-1 North Fork Fire Protection District Hazard Summaries– Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Unlikely	Negligible	Low
Cyber Attack	Limited	Unlikely	Negligible	Low
Dam Failure	Significant	Occasional	Critical	High
Drought	Extensive	Likely	Critical	Medium
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Limited	Likely	Limited	Low
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Critical	High
Hailstorm	Significant	Likely	Critical	High
Landslide, Debris flow, Rockfall	Limited	Likely	Negligible	Medium
Lightning	Limited	Highly Likely	Limited	Medium
Pandemic	Significant	Likely	Limited	Medium
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Medium
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Significant	Likely	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



P.4 District Asset Inventory

Table P-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table P-2 Critical Facilities within District Boundaries

FEMA Lifeline	CF Type	Count
Communications	Land Mobile Private Towers	15
	Microwave Service Towers	1
Hazardous Material	Tier II	1
Safety and Security	Fire Station	3
Transportation	Bridge	9

Source: HIFLD and CERC

Table P-3 lists District owned or maintained assets important to protect in the event of a disaster.

Table P-3 North Fork Fire Protection District Assets

Name of Asset	Address	Replacement Value (\$)	Hazard Specific Vulnerability
North Fork Station One	19384 CR 126 Buffalo Cr. Co 80425	\$1,000,000	None identified
North Fork Station Two	16675 CR 126 Pine Co 80470	\$750,000	None identified
North Fork Station Three	7883 HY 67 Sedalia Co 80135	\$500,000	None identified

Source: HMPC

P.5 Vulnerability Assessment

The intent of this section is to assess the District’s vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the North Fork Fire Protection District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District’s risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Drought
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.



P.5.1 Dam Incidents/Failure

Figure 4-7 in Section 4.3.3 of the Base Plan shows potential dam inundation areas in the North Fork Fire Protection District, primarily along the South Platte River. There are a number of high hazard potential dams in and upstream of the District exposing six critical facilities, half of which are bridges. Results of the analysis is shown in Table P-4 and is organized by critical facility type and FEMA Lifeline.

Table P-4 Critical Facilities within District Boundaries at Risk to Dam Failure

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
Hazardous Material	Tier II	1
Safety and Security	Fire Station	1
Transportation	Bridge	3
Total		6

Source: HIFLD and CERC

P.5.2 Flood

Figure 4-34 in the Base Plan shows that the North Fork Fire Protection District has mapped 1% and 0.2% floodplains, primarily along the South Platte River and Elk Creek. There are four critical facilities within the 1% annual flood chance areas, three of which are bridges; there are no critical facilities in 0.2% floodplains in the District. Table P-5 shows the results of the analysis by critical facility type and FEMA Lifeline.

Table P-5 Critical Facilities within District Boundaries at Risk to 1% Annual Chance Flood

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	1
Transportation	Bridge	3
Total		4

Source: HIFLD and CERC

P.5.3 Geologic Hazards

There are no areas identified at risk to soil hazards in the North Fork Fire Protection District.

P.5.4 Wildfire

Past Events

The following wildfire events had notable impact on the North Fork Fire Protection District:

Buffalo Creek Fire - May 18-25, 1996: The Buffalo Creek fire burned approximately 10,400 acres. High winds caused extreme fire behavior, leading to a 10 mile run in only six hours. 10 homes or other outbuildings were lost. This fire marked the first large WUI fire in the Front Range. Costs for the fire were estimated at \$3,835,000.

Hayman Fire - June 8-July 2002: The Hayman Fire burned more than 138,000 acres. The human caused fire expanded on the second day for a historic 19-mile run and 70,000 acres. Multiple evacuations over a two-week period were required as the fire made additional 'runs' in multiple counties. Over 150 homes and structures were lost, and large areas of damage were caused to Cheeseman Reservoir and South Platte Watershed areas.

Lower North Fork Fire - March 26-31, 2012: The Lower North Fork wildfire south of Conifer scorched a total of 4,150 acres. Strong southwest winds ahead of an approaching cold front produced high to extreme fire danger across the Front Range Foothills and Palmer Divide. As a result, a 50-acre prescribed burn that had been conducted the previous week reignited in the foothills of Jefferson County, southwest of Denver. The strong wind gusts carried embers from the interior of the burn area, across containment lines and into very dry fuels which initiated the wildfire. It then spread into the crowns of the trees and driven by the strong winds, quickly advanced to the northeast onto private lands. Local



firefighters immediately responded to the wildfire, but were unable to contain it, due to the extreme winds and dry and abundant fuels.

The combination of very strong winds, record warm temperatures and extremely dry conditions for month of March; all contributed to a rapid increase in fire growth during the afternoon of March 26th. A total of 900 homes were evacuated on the 26th. The fire destroyed 27 homes and resulted in the deaths of three local residents. The property damage alone was estimated to be \$11 million. The wildfire was not 100 percent contained until April 2nd.

Estimating Losses

As shown in Figures 4-49 through 4-43, North Fork Fire Protection District does have exposure to wildfire risk, although its WUI risk is relatively low. There are a total of 26 critical facilities at risk to wildfire (Table P-6) or 90% of the total critical facilities within the District. A majority of the critical facilities are exposed to high (12) or moderate (11) wildfire risk.

Table P-6 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
0	3	11	12	0	26	90%

Source: HFLID and CERC

P.5.5 Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. That is the reason for the asset inventory provided in section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

P.6 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.

P.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table P-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 Elk Creek Fire Protection District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table P-7 North Fork Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	Completed in 2011
General or Comprehensive plan	Yes	County
Zoning ordinance	Yes	County
Subdivision ordinance	Yes	County
Growth management ordinance	Yes	County
Floodplain ordinance	Yes	County
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	County
Building code	Yes	County



Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Fire department ISO rating	Yes	5/10, improved from 6/10 in 2015
Erosion or sediment control program	Yes	County
Stormwater management program	Yes	County
Site plan review requirements	Yes	County
Capital improvements plan	No	
Economic development plan	No	
Local emergency operations plan	Yes	County
Other special plans	No	
Flood insurance study or other engineering study for streams	Yes	County
Elevation certificates (for floodplain development)	Yes	County

P.6.2 Administrative/Technical Mitigation Capabilities

Table P-8 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table P-8 North Fork Fire Protection District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	NA		
Planner/engineer/scientist with an understanding of natural hazards	NA		
Resiliency Planner	NA		
Transportation Planner	NA		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	NA		
Personnel skilled in GIS	NA		
Full time building official	NA		
Floodplain manager	NA		
Emergency manager	NA		
Grant writer	NA		
Other personnel	NA		
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	NA		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	NA		

P.6.3 Fiscal Mitigation Capabilities

Table P-9 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.



Table P-9 North Fork Fire Protection District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	Yes	No	
Capital improvements project funding	Yes	Yes	
Authority to levy taxes for specific purposes	Yes	Yes	Voter approval needed
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	No	No	
Incur debt through general obligation bonds	Yes	No	Voter approval needed
Incur debt through special tax bonds	Yes	No	Voter approval needed
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	

P.6.4 Mitigation Outreach and Partnerships

Table P-10 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table P-10 Public Education and Outreach Mitigation Capabilities

Public Education and Outreach	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	No
Firewise	No
StormReady	No
Other	North Fork FPD uses its social media sites for fire prevention and education including wildfire and other life safety events.

Public Education Programs: North Fork conducts general fire safety programs which include wildland fire mitigation and preparedness.

P.6.5 Opportunities for Enhancement

Based on the capability assessment, North Fork FPD has several existing mechanisms in place that already help to mitigate hazards. Continuing to expand the education and involving more stake holders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs.

North Fork FPD will continue to seek more involvement with homeowner associations and property owners to improve mitigation efforts in the WUI. The North Fork FPD also believes there are opportunities to strengthen WUI fire codes working in conjunction with county officials in the future to make communities more fire adaptive.

P.7 Plan Implementation and Maintenance

The North Fork Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also



includes a discussion of how the District will continue public participation in the plan maintenance process.

P.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

The North Fork Fire Protection District recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, the District has participated in collaborative groups in attempts to improve public outreach informing them about the risks associated with wildfire as identified in the 2016 plan. This has included organizations seeking common goals reducing threats in the watershed and reducing loss potential in the WUI. The District has also improved public outreach through social media sites that it uses

P.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The District Fire Chief will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Chief will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

P.8 Mitigation Strategy

The North Fork Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District had two mitigation actions in the 2016 Plan and has not completed either of them. Those actions have been carried over into the 2021 Plan, along with one new action.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table P-11 North Fork Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
North Fork Fire 1	Public Outreach and Education on Wildfire Mitigation. Following recommendations set forth in the North Fork 2011 CWPP we would like to improve our Community Education Program. This will involve informing the public of the inherent risk of wildland fire in the area through community meetings and distribution of educational materials. Education is important to prepare citizens for wildfire and to teach them about taking mitigation action on their own properties to minimize wildfire impacts. Benefits include Improve personal safety in the event of a wildfire. Reduction in homes/property loss due to wildfire.	Wildfire	1,3	North Fork Fire Protection District	\$6,000 over 5 years. Grant funding	High	Within 2 years	In Progress. Wildfire in the urban interface remains the largest threat within the District. The District has participated in several ways to reach the public on education wildfire mitigation since the last plan including participation with larger regional programs. Updating CWPP in the future will also be high priority to increase public awareness in the District.
North Fork Fire 2	Recruit & Retain additional Volunteer Firefighters. The North Fork Fire Department has a current roster of 25 firefighters. Several members are nearing retirement. The District has identified the need to maintain staffing of 25-35 firefighters. The Department covers a large geographic area with small population base. Maintaining adequate staffing level is difficult. The District would like to add 10 additional firefighters. Benefits include Adequate staffing levels are imperative to insure prompt initial attack in wildland and structural settings.	Wildfire	2,3	North Fork Fire Protection District	\$30,000; operating budget. Grant funding will also be pursued.	High	Within 3-4 years	In Progress. The District continues attempts to recruit and retain volunteer firefighters. Numbers continue on downward trend as seen nationally. Will continue to explore methods to recruit and retain members.
North Fork Fire 3	Community Wildfire Protection Plan update. The North Fork Fire Protection Plan is currently 10 years old, and needs updated to reflect changes in the District over that time period. The	Wildfire;	1; 2; 3; S&S;	North Fork Fire Protection District County, State and	\$10,000 - \$100,000 Grants, District Budget	High	1-2 years	New in 2021



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	CWPP is a strategic plan that identifies specific wildland fire risks facing the communities and neighborhoods within the District. The CWPP provides prioritized mitigation recommendations that are designed to reduce those risks.			Federal agencies.				



Annex Q. West Metro Fire Protection District

Q.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The West Metro Fire Protection District fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section A.9. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

Q.2 Community Profile

West Metro Fire Protection District was created January 1, 1995 when Lakewood and Bancroft Fire Protection Districts were consolidated. The two departments originally formed the Lakewood-Bancroft Fire Authority to give the two departments an opportunity to find efficiencies. Voters ultimately approved the merger and the West Metro Fire Protection District was formed. In April of 2016, the West Metro Fire Protection District further expanded through a merger with Wheat Ridge Fire. Today West Metro Fire Rescue has nearly 380 full-time firefighters who staff 17 stations over more than 110 square miles. The District serves nearly 300,000 residents in the cities of Golden, Lakewood, Morrison, Wheat Ridge, Edgewater, Littleton, Unincorporated Jefferson County, as well as the communities of Roxborough and Waterton Canyon in Douglas County. See service area map in Figure Q-1.

Q.2.1 Growth and Development Trends

West Metro Fire Protection District's service area is mainly urban and as such most of the protection district is already developed and most growth is infill, although there is still some growth occurring within the District in portions of the Wildland/Urban Interface. New construction has modern protection systems and better code compliance. In areas within the interface, overall vulnerability increases as more structures and population are added to the hazard area.

Q.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for West Metro Fire Protection District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction and special district was in support of the main hazard summary identified in the base plan; however, the hazard summary for each annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the District's risk and vulnerabilities from that of the overall County. Table Q-1 summarizes West Metro Fire District's hazards based on input provided during the planning and data collection process. For the 2021 plan update, the West Metro Fire Protection District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Figure Q-1 is based on West Metro Fire Protection District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this, the most significant hazards for the West Metro District are flood, pandemic, and wildfire.



Figure Q-1 West Metro Fire Protection District Service Area

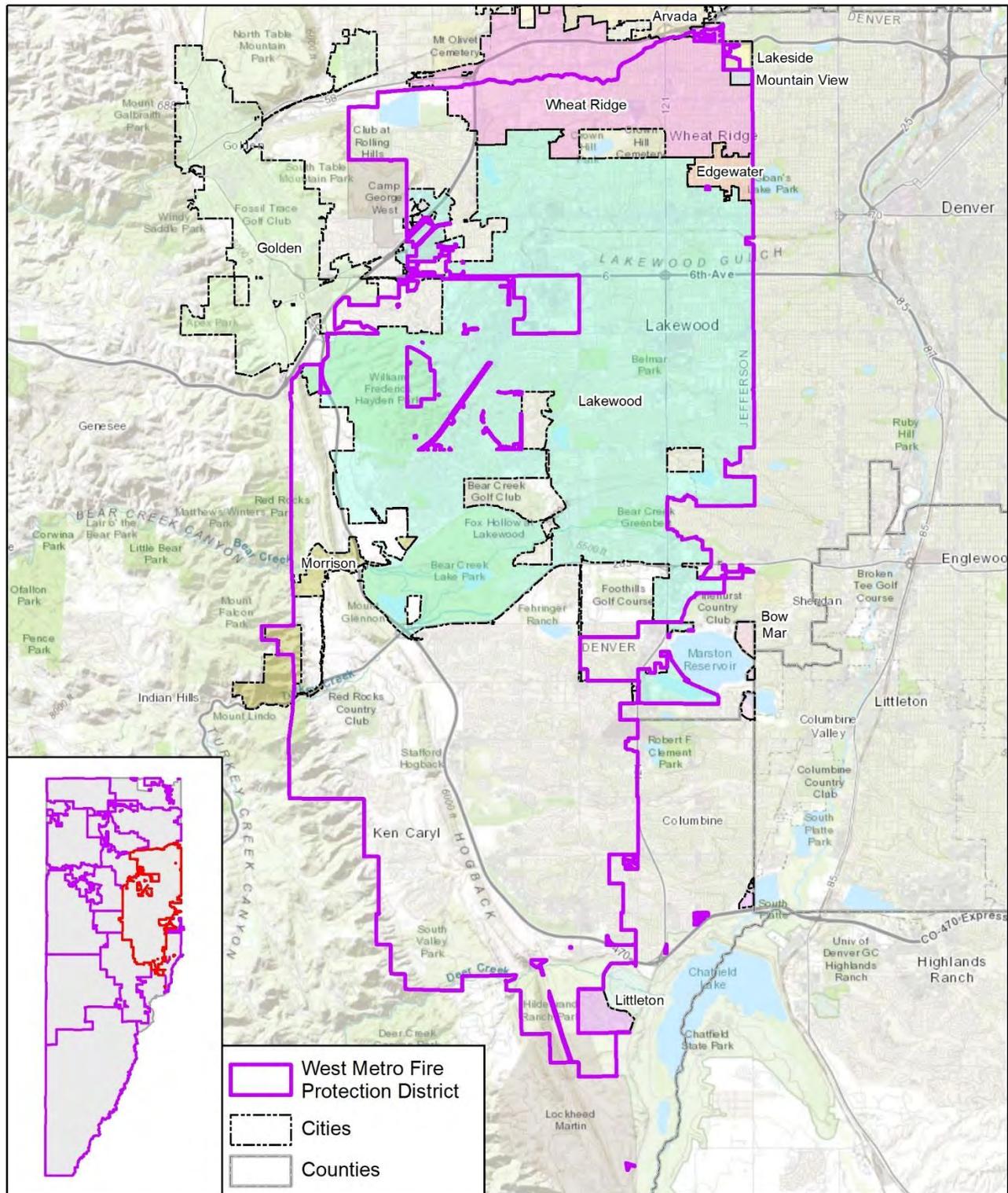




Table Q-1 West Metro Fire Protection District – Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible	Occasional	Negligible	Low
Cyber Attack	Extensive	Likely	Limited	Medium
Dam Failure	Limited	Occasional	Limited	Low
Drought	Extensive	Occasional	Negligible	Low
Earthquake	Extensive	Unlikely	Catastrophic	Medium
Erosion and Deposition	Negligible	Occasional	Negligible	Low
Expansive Soils	Negligible	Likely	Negligible	Low
Extreme Temperatures	Extensive	Occasional	Limited	Low
Flood	Extensive	Occasional	Critical	High
Hailstorm	Extensive	Likely	Limited	Low
Landslides, Debris/Rockfalls	Negligible	Occasional	Negligible	Low
Lightning	Negligible	Highly Likely	Negligible	Low
Pandemic/Public Health	Extensive	Occasional	Catastrophic	High
Severe Winter Storms	Extensive	Likely	Limited	Medium
Subsidence	Negligible	Unlikely	Negligible	Low
Tornado	Limited	Occasional	Limited	Low
Wildfire	Limited	Highly Likely	Critical	High
Windstorm	Extensive	Highly Likely	Limited	Medium
<p>Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>		<p>Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>		



Q.4 District Asset Inventory

Table Q-2 lists the critical facilities within the District boundaries organized by FEMA Lifeline and critical facility type.

Table Q-2 Critical Facilities within District Boundaries

FEMA Lifeline	CF Type	Count
Communications	AM Transmission	2
	Cellular	1
	FM Transmission	1
	Land Mobile Private Towers	168
	Microwave Service Towers	189
	Paging Transmission	1
Energy	Electric Substation	8
Food, Water, Shelter	Shelter	7
	Wastewater Plant	3
	Water Facility	1
Hazardous Material	RMP Facility	1
	Tier II	35
Health and Medical	Clinic	2
	Hospital	4
	Mental Health Services	2
	Nursing Home	92
	VA Medical Facility	1
Safety and Security	EOC	2
	Fire Station	15
	Government Facility	18
	Law Enforcement	11
	School	110
Transportation	Aircraft Facility	4
	Bridge	119
	Government Facility	4

Source: HIFLD and CERC

Table Q-3 District owned or maintained assets important to protect in the event of a disaster.

Table Q-3 West Metro Fire Protection District Assets

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Vulnerabilities
Administration	\$9,597,141.00	490	None identified
Fleet Maintenance	\$3,986,274.00	6	None identified
Old Tens	\$1,653,788.00	n/a	None identified
Station 1	\$2,646,204.00	7	None identified
Station 2	\$2,432,703.00	8	None identified
Station 3	\$3,348,787.00	9	None identified



Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Vulnerabilities
Station 4	\$4,084,496.00	10	None identified
Station 5	\$3,835,796.00	10	None identified
Station 6	\$1,779,700.00	5	None identified
Station 7	\$4,802,694.00	10	None identified
Station 8	\$2,122,705.00	10	None identified
Station 9	\$2,456,880.00	6	None identified
Station 10 & Training	\$16,341,936.00	12/500	None identified
Station 11	\$3,515,010.00	4	None identified
Station 12	\$2,067,183.00	6	None identified
Station 13	\$2,469,068.00	6	None identified
Station 14	\$3,358,590.00	10	None identified
Station 15	\$3,314,207.00	7	None identified
Station 16	\$5,117,700.00	7	None identified
Station 17	\$2,979,900.00	4	None identified
Communications	\$1,636,826.00	n/a	None identified

Source: HMPC

Q.5 Vulnerability Assessment

The intent of this section is to assess West Metro Fire District's vulnerability separately from that of the planning area as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see the Risk Assessment in Chapter 4.

Q.5.1 Dam Incidents/Failure

Figure 4-8 in Section 4.3.3 of the Base Plan shows potential dam inundation areas in the West Metro Fire Protection District, primarily along Ralston Creek, Clear Creek, and Bear Creek. There are a number of high hazard potential dams upstream of the District exposing 87 critical facilities; this represents 11% of the total critical facilities identified within the District. Results of the analysis is shown in Table Q-4 and is organized by critical facility type and FEMA Lifeline.

Table Q-4 Critical Facilities within District Boundaries at Risk to Dam Failure

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	9
	Microwave Service Towers	5
Energy	Electric Substation	2
Hazardous Material	Tier II	2
Health and Medical	Nursing Home	14
Safety and Security	Fire Station	1
	Government Facility	2
	School	4
Transportation	Bridge	48
	Total	87

Source: HIFLD and CERC



Q.5.2 Flood

There is significant risk of flooding in the West Metro Fire Protection District. Figure 4-35 in the Base Plan shows a number of structures in both 1% and 0.2% floodplains along most of the District's waterways. A total of 56 critical facilities are located in 1% floodplains, with an additional 29 in 0.2% floodplains; this represents 11% of the critical facilities identified in the District.

Table Q-5 Critical Facilities within District Boundaries at Risk to 1% Annual Chance Flood

Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	8
	Microwave Service Towers	3
Energy	Electric Substation	2
Food, Water, Shelter	Wastewater Plant	1
Safety and Security	Fire Station	1
Transportation	Bridge	41
	Total	56

Source: HIFLD and CERC

Table Q-6 Critical Facilities within District Boundaries at Risk to 0.2% Annual Chance Flood

Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	8
Health and Medical	Nursing Home	1
Safety and Security	Fire Station	1
	Government Facility	1
Transportation	Bridge	18
	Total	29

Source: HIFLD and CERC

Q.5.3 Geologic Hazards

West Metro Fire Protection District has exposure to some geologic hazards including landslide and dipping bedrock. Figure 4-42 in the Base Plan shows some limited areas at risk of landslide or slope failure; this includes on communications tower. Figures 4-22 and 4-23 in the Base Plan show significant sections of the District at risk of expansive soils, subsidence, and dipping bedrock. 114 critical facilities are potentially exposed to dipping bedrock, representing 14% of the total critical facilities in the District.

Table Q-7 Critical Facilities within District Boundaries at Risk to Dipping Bedrock

FEMA Lifeline	Critical Facility Type	Count
Communications	Land Mobile Private Towers	15
	Microwave Service Towers	24
Energy	Electric Substation	2
Food, Water, Shelter	Wastewater Plant	1
Hazardous Material	Tier II	6
Health and Medical	Nursing Home	8
Safety and Security	Fire Station	3
	Government Facility	1
	Law Enforcement	1
	School	17



FEMA Lifeline	Critical Facility Type	Count
Transportation	Bridge	32
	Government Facility	4
	Total	114

Source: HIFLD and CERC

Wildfire

West Metro Fire Protection District does have exposure risk to wildfire both in terms of critical facilities and parcels/structures in WUI communities. As shown in Figures 4-49 through 4-54 in the Base Plan, there are a number of areas in the District at risk of wildfire, ranging from lowest to high risk, including significant WUI areas.

According to the GIS based analysis of wildfire, West Metro FPD has 100 critical facilities at risk to wildfire, although most of those are at low risk (Table Q-8); this represents 12% of the total critical facilities within the District.

Table Q-8 Critical Facilities within District Boundaries at Risk to Wildfire

Lowest	Low	Moderate	High	Highest	Total	% of Total Critical Facilities
61	10	22	7	0	100	

Source: HFLID and CERC

Other Hazards

In the case of other hazards that are not specific to geography such as drought, hailstorms, winter storms, earthquake, lightning, tornado and windstorm the entire building inventory and population in the District is potentially exposed. That is the reason for the asset inventory provided in Section 1.3. It should be noted that no hazard in this plan is expected to cause widespread impacts to this inventory.

Q.6 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.

Q.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table Q-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 West Metro Fire Protection District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table Q-9 West Metro Fire Protection District's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	Yes	Updated 2021
General or Comprehensive plan	Yes	
Zoning ordinance	Yes	As administered by municipalities/County
Subdivision ordinance	Yes	As administered by municipalities/County
Growth management ordinance	Yes	As administered by municipalities/County
Floodplain ordinance	Yes	As administered by municipalities/County
Floodplain Management Plan		
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	As administered by municipalities/County



Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Building codes (with Year)	Yes	As administered by municipalities/County
Fire department ISO rating	Yes	ISO Rating of 1 (increased from 3 in 2018.)
Erosion or sediment control program	Yes	As administered by municipalities/County
Storm water management program	Yes	As administered by municipalities/County
Site plan review requirements	Yes	All plans reviewed by fire marshal
Capital improvements plan	Yes	
Economic development plan	Yes	As administered by municipalities/County
Local emergency operations plan	Yes	
Other special plans	Yes	Accreditation standard of cover document
Flood insurance study or other engineering study for streams		
Elevation certificates (for floodplain development)		
BCEGS Ratings (1-10)		

Q.6.2 Administrative/Technical Mitigation Capabilities

Table Q-10 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.

Table Q-10 West Metro FPD Administrative/Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	No		
Planner/engineer/scientist with an understanding of natural hazards	No		
Resiliency Planner	No		
Transportation Planner	No		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Fire Marshal	Position filled by a licensed architect.
Personnel skilled in GIS	Yes	Communications	GIS position in Jeffcom 911.
Full time building official	Yes	Fire Marshal	
Floodplain manager	No		
Emergency manager	Yes	Division Chief, Special Ops and Emergency Management	Position of department emergency manager created 1/1/2020. No longer shared with JCSO.
Grant writer	Yes	Fire Chief's Office	
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	TriTech Computer Aided Dispatching System	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	CodeRED	Also internal warning/alerting system "CrewSense"

Q.6.3 Fiscal Mitigation Capabilities

Table Q-11 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table Q-11 West Metro Fire Protection District's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	Yes	No	
Capital improvements project funding	Yes	Yes	



Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Authority to levy taxes for specific purposes	Yes	Yes	
Fees for water, sewer, gas, or electric services	No	No	
Impact fees for new development	Yes	No	
Incur debt through general obligation bonds	Yes	Yes	
Incur debt through special tax bonds	Yes	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	No	No	
Stormwater Service Fees	No	No	

Q.6.4 Mitigation Outreach and Partnerships

Table Q-12 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table Q-12 West Metro Fire Protection District’s Education & Outreach Capabilities

Resources	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Yes, active engagement with multiple community groups to receive feedback and disseminate information. Dedicated community risk reduction specialist.
Firewise	Yes, member department and engagement with multiple Firewise communities.
StormReady	Under development
Public Education Programs	Full-time staff delivers fire safety education district-wide.

Q.6.5 Opportunities for Enhancement

Based on the capability assessment, West Metro FPD has several existing mechanisms in place that already help to mitigate hazards. Continuing to expand the education and involving more stake holders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs.

The 2021 Community Wildfire Protection Plan forms the basis for WUI mitigation activities. Enhancements that will come from the plan and its implementation include community planning, individual property risk assessments, public education, and enhanced response capabilities. In addition, a web-user interface will allow individual property owners to gather up-to-date risk data on their properties and communities.

Q.7 Plan Implementation and Maintenance

West Metro Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

Q.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

West Metro Fire Protection District recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, deconfliction of planning efforts continues to be a priority and the 2016 HMP was considered and referenced wherever applicable.



Q.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The Division Chief of Special Operations and Emergency Management will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Division Chief of Special Operations and Emergency Management will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the District Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

Q.8 Mitigation Strategy

The West Metro Fire Protection District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Section 6.2 of the Base Plan.

The District had one mitigation action in the 2016 Plan, which has not been completed. That action has been carried over into the 2021 Plan, along with one new action.

The District identified and prioritized the following mitigation actions based on the risk assessment. 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table Q-13 West Metro Fire Protection District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
West Metro Fire 1	Wildfire fuels reduction. This project will perform hazard fuel mitigation in areas within West Metro's district that have been identified as high-hazard in countywide and individual CWPPs. Different methods might include tree thinning, mastication, and controlled burning. Benefits include Fuel mitigation projects improve public safety, reduce risk to firefighters, and help forest ecology.	Wildfire	2	West Metro Fire Rescue	Varies depending on the fuel type and acreage. \$2,000 per acre is a good estimate. Grant funding – state (CSFS) and federal (FEMA PDM or HMGP) Schedule: 2016-2020	High	2021-2022	In Progress. Activities are outlined in the 2021 CWPP update to be approved in 2021.
West Metro Fire 2	CWPP Implementation. West Metro Fire Rescue will be adopting a new Community Wildfire Protection Plan in 2021. It is expected that the CWPP will suggest several wildfire mitigation strategies that the organization will adopt. At the time of this plan the new CWPP is not complete and therefore it is not possible to identify any specific actions yet.	Wildfire	1, 2, 3; S&S, FWS	West Metro Fire Rescue	\$100,000 - \$1,000,000; Department budget, grants, alternative sources if available	High	Starting in 2021	New in 2021

Annex R. Denver Water

R.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. Denver Water fully participated in the 2021 update process as described in Section 3. Denver Water had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section 3. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the City on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

R.2 Community Profile

Denver Water is an Article XX home-rule municipality governed by a board of five commissioners appointed by the Mayor as per Article X of the Denver City Charter. Denver Water provides water to approximately 1.5 million people in the Denver metropolitan areas and is a property owner in Jefferson County. 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. The CEO/Manager is appointed by the Board to execute its policies and orders. Denver Water's service area (Figure R-1) encompasses the communities of Wheat Ridge, Lakeside, Mountain View, Edgewater and Lakewood. Denver Water also serves the following communities in Jefferson County, not covered in this plan: Dakota Ridge, Ken Caryl, and Columbine. Denver Water does not serve Arvada, Fairmount, Pleasant View, Golden or Morrison.

R.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for Denver Water using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction and special district was in support of the main hazard summary identified in the base plan; however, the hazard summary for each annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate Denver Water's risk and vulnerabilities from that of the overall County. Table R-1 summarizes Denver Water's hazards. For the 2021 plan update, Denver Water's planning team members were asked to revisit and validate or update the matrix based on their current experience and the perspective of Denver Water.

The hazard significance listed in Table R-1 is based on Denver Water HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for Denver Water are dam failure, drought, wildfire, and earthquake.

Figure R-1 Denver Water Service Area

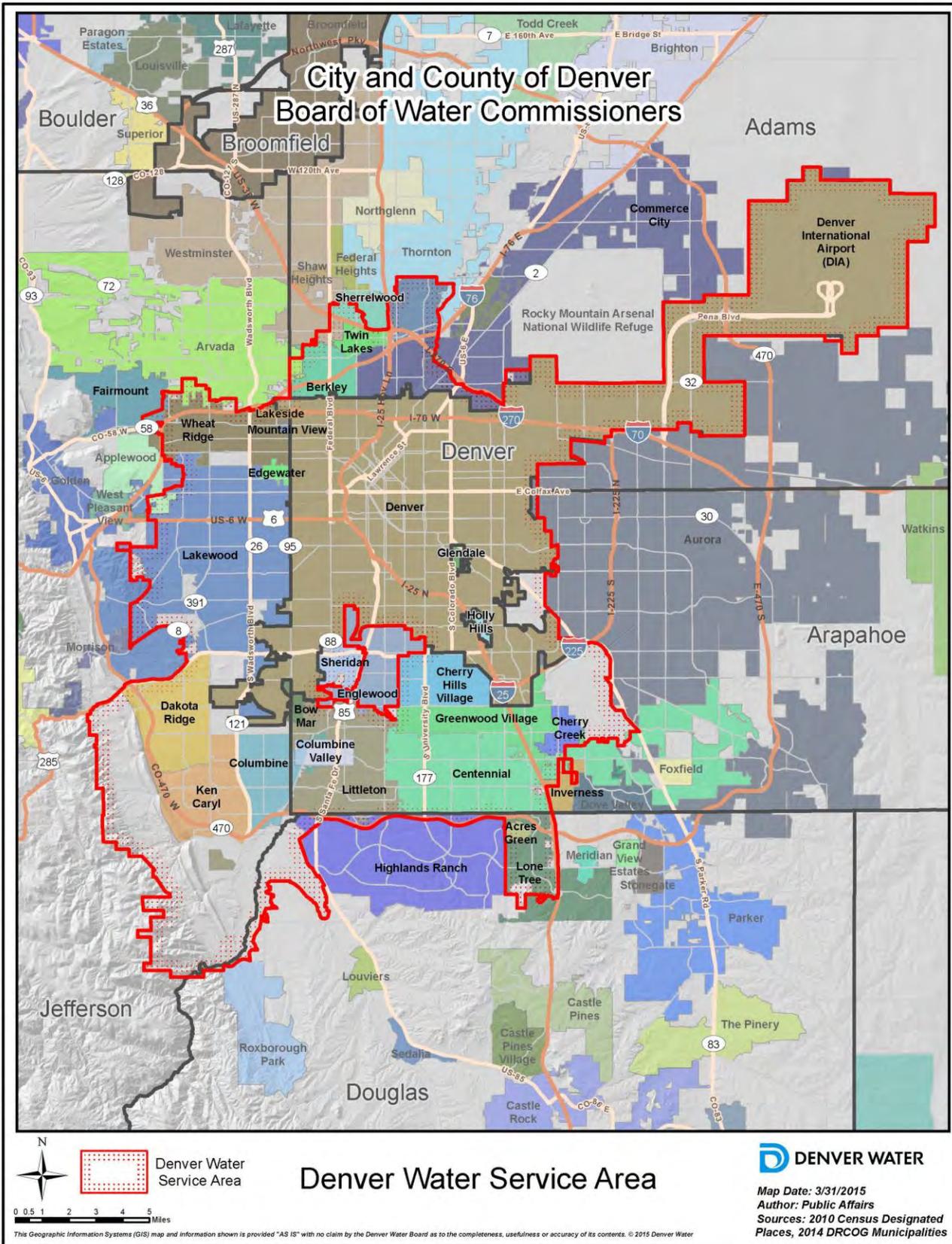


Table R-1 Denver Water – Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Limited	Low	Low	Low
Cyber Attack	Limited	Likely	Medium	Medium
Dam Failure	Limited	Low	High	High
Drought	Significant	High	Low	High
Earthquake	Significant	Low	Low	High
Erosion and Deposition	Limited	Medium	Low	Low
Expansive Soils	Limited	Medium	Low	Low
Extreme Temperatures	Extensive	Medium	Low	Low
Flood	Significant	Low	Medium	Medium
Hailstorm	Significant	Medium	Medium	Low
Landslide, Debris flow, Rockfall	Limited	Low	Low	Low
Lightning	Significant	Medium	Low	Low
Pandemic/Public Health	Limited	Occasional	Limited	Low
Severe Winter Storms	Extensive	Medium	Low	Low
Subsidence	Limited	Medium	Low	Low
Tornado	Limited	Medium	Low	Low
Wildfire	Extensive	High	Low	Low
Windstorm	Significant	Medium	Low	Low
Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.		Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year. Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.		

R.4 Asset Inventory

Table R-2 lists Denver Water owned or maintained assets important to protect in the event of a disaster.

Table R-2 Denver Water Assets

Name of Asset	Facility Type	Replacement Value	Hazard Specific Info/Comments
Cheesman Dam and Reservoir	Dam and reservoir	\$300 million	
Cheesman Dam Valve House	Valve house	\$30 million	
Churches Dam	Dam		
Conduit 20 Diversion Dam (Marston Diversion)	Dam	\$15 million	
Conduit 26	Conduit	\$4 million (1,900 ft buried pipe)	
Foothills Spray Application Pump Station	Pump station	\$1 million	
Foothills Treatment Plant	Treatment Plant	\$600 million	
Foothills Overflow Holding Pond	Pond	\$5 million	
Harriman Dam	Dam		
High Line Canal Diversion Dam	Dam	\$5 million	
High Line Canal Waterton Canyon	Canal		
Lone Tree Pump Station	Pump station	\$10 million	
Lone Tree Treated Reservoir No. 1	Reservoir		
Lone Tree Treated Reservoir No. 2	Reservoir		
Lower Long Lake Dam	Dam		
Marston Lake - West Dike	Dam and reservoir		
Platte Canyon Dam and Reservoir	Dam and reservoir	\$25 million	
Ralston Dam and Reservoir	Dam and reservoir		
Strontia Springs Dam and Reservoir	Dam and reservoir	\$400 million	
Upper Long Lake Dam	Dam		

Source: Denver Water

R.5 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 the Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see Risk Assessment.

R.5.1 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.

An estimate of the vulnerability of Denver Water to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Low—Minimal potential impact.** The occurrence and potential cost of damage to life and property is minimal.
- **Medium—Moderate potential impact.** This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.

- **High—Widespread potential impact.** This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.

Drought

The most significant impacts associated with drought and water shortage for Denver Water are those related to water intensive activities such as wildfire protection and municipal usage. Denver Water will utilize their Water Shortage Response Plan during water shortage events. This plan contains progressive stages that can be enacted. These stages contain voluntary and mandatory conservation measures in addition to specific curtailments of water usage for specific industries. Denver Water uses various indicators when deciding to enact restrictions. These indicators include geographical, environmental and economic conditions on the western slope, where most of the Denver Water's most critical assets are located. However, restrictions and subsequent reductions in usage on the western slope do not increase water in streams and waterways in Denver Water's collection system. Revenue shortages, water quality issues and recycled water availability are all potential impacts during water shortage events. In addition, a lack of available water can also lower reservoir levels, which exposes more shoreline to erosion. This can result in increased water treatment costs. During an extraordinary, long-term water shortage event, hydropower availability may be at risk.

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so too will the demand for water.

During the 2002 drought, Denver Water experienced a variety of drought-related impacts including the reduction in storage reserves, disruption of water supplies, loss of revenue from reduction in water sales, increased costs to respond to the drought and degraded water quality. An indirect impact was the Hayman wildfire that caused significant erosion and disrupted South Platte River supplies. Denver Water primarily responded to the drought through mandatory water restrictions and an effective drought public education campaign encouraging wise water use and conservation. Despite the 2002 drought impacts mentioned above, Denver Water was able to meet the essential needs of its service area during 2002.

The most significant qualitative impacts associated with drought in Denver Water are those related to water intensive activities such as wildfire protection and municipal usage. Mandatory conservation measures are typically implemented by the municipalities during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Development Trends

Drought vulnerability will increase with future development as there will be increased demands for limited water resources. Denver Water can mitigate drought impact by supporting water conservation measures such as water use audits, wastewater reuse, and water efficient transmission.

Earthquake

Ground shaking is the primary earthquake hazard, but cascading impacts can include landslides, rockfall, dam failure and ground failure. Many factors affect the survivability of structures and systems from earthquake-caused ground motions. These factors include proximity to the fault, direction of rupture, epicenter location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. Ground motions become structurally damaging when average peak accelerations reach 10 to 15% of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity Scale is about VII (18-34% peak ground acceleration), which is considered to be very strong (general alarm; walls crack; plaster falls).

Potential earthquake impacts specific to Denver Water were not available, but the primary concern is damage to water infrastructure and dams. The HAZUS-MH 2.1 analysis provided in Section 4.3.4 in the base plan is countywide and does not differentiate water infrastructure impacts specific to Denver Water.

Development Trends

Damage to dams caused by earthquakes would be of particular concern to the Denver Water. Utilizing high development standards for dams and developing and exercising EAPs can help mitigate the impact of damages caused by earthquakes.

Dam Failure

Past Events - 2013 Flooding Event

In September 2013, Jefferson County and the entire Front Range experienced heavy rainfall over an eight-day period from the 11th to the 18th. The rainfall caused many dam spillways to flow in Jefferson County and the surrounding area. The Ralston Reservoir is a water supply reservoir on Ralston Creek west of Arvada and is owned by Denver Water. Due to not being a reservoir for flood storage, on September 12, 2013 the Ralston Reservoir released water into the emergency spillway. This resulted in significant erosion on a steep hillside near Highway 93. The spillway discharge added to the downstream watershed contribution, causing substantial channel and erosion damage before reaching Arvada/Blunn Reservoir.

A catastrophic dam failure would challenge local response capabilities and require timely evacuations to save lives in Denver Water's service area. Impacts to life safety would 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. The economic impacts of a failure of a Denver Water-owned dam would be considerable, in addition to water supply consequences that could impact multiple jurisdictions.

Based on a search of the National Performance of Dams database there have been thirteen incidents in Jefferson County since 1952. Of these incidents reported to the National database, three incidents involved dams owned by Denver Water. As shown in Table R-3, all three events took place in 2015 and none involved a failure of the dams. A brief profile of the anticipated impacts for dam failures for the high hazard dams, based on the contents of the dam emergency action plans (EAP) is discussed.

Table R-3 Denver Water Dam Incidents

Date	Dam Name	Waterway	Downstream Community	Dam Hazard Potential	Event Description	Failure?
May 22, 2015	Strontia Springs	S. Platte River	Littleton	High	High Reservoir Level	No
June 16, 2015	Eleven Mile Canyon	S. Platte	Unincorporated Jefferson County	High	Hydrologic/flooding – High Reservoir Level	No
June 17, 2015	Cheesman	S. Platte River	Unincorporated Jefferson County	High	Hydrologic/flooding – High Reservoir Level	No

Source: National Performance of Dams database, Stanford University and Association of State Dam Safety Officials Dam Incident Database

Denver Water Dams that Pose a Potential Risk to Jefferson County

Denver Water operates ten dams in Jefferson County, detailed in the table below. Of the ten dams six are classified as a high hazard dam with the potential to impact the County. In addition to the Denver Water dams within Jefferson County, there are three dams upstream, two of which are classified as high hazard, that may pose a risk a Jefferson County. The likelihood and impacts of an incident at each of these dams are discussed in Section 4.3.2 of the Base Plan. Failure of the dams are unlikely but would have extensive consequences both in terms of economic losses to Denver Water, as well as the loss of the water resource for a period of time. Outside of potential effects to Denver Water infrastructure, failure of the dam would also result in damage to downstream communities and property and potential loss of life.

Table R-4 Denver Water Dams Located in Jefferson County

Dam Name	Stream	Downstream Community	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Cheesman	South Platte River	Deckers	79,064	Yes	High
Harriman	Weaver Creek	Lakewood	762	Yes	High
Lower Long Lake*	Ralston Creek	Arvada	292	Yes	High
Ralston	Ralston Creek	Arvada	10,749	Yes	High
Strontia Springs	South Platte River	Kassler	7,700	Yes	High
Upper Long Lake*	Ralston Creek	Arvada	1,500	Yes	High
Churches	Ralston Creek	Arvada	48	No	Low
Platte Canyon	Little Willow Creek	Littleton	963	No	Low
Conduit 20 (Marston Diversion)	South Platte River	Littleton	220	No	Low
Marston Lake - West Dike	South Platte River	Denver	19,795	Yes	NPH**

Source: National Inventory of Dams, NHD Notes: * represents dams that have been rated as unsatisfactory or conditionally satisfactory by the State Engineer. **NPH – No Public Hazard

Table R-5 Denver Water Dams Located Upstream of Jefferson County

Dam Name	Stream	Downstream Community	Storage Capacity (Acre-Feet)	Emergency Action Plan?	Hazard Rating
Foothills Holding Pond	Willow Creek	Littleton	43	No	Low
Antero	S. Fork S. Platte River	Hartsel	44,733	Yes	High
Eleven Mile Canyon	South Platte River	Lake George	97,800	Yes	High

Source: National Inventory of Dams, NHD

Non-Failure Dam Incidents

As discussed in Section 4.3.3 of the Base Plan, the Colorado Department of Natural Resources, Dam Safety Division, has a statewide database that identifies the potential for non-failure dam inundation to show potential areas of flooding where outlet capacity exceeds the downstream channel capacity. The dams at the highest risk of non-failure inundation are shown in Table 4-14 of the Base Plan. The ranking shown in the table represents the likelihood of hazardous conditions existing below the dams during a worst case, maximum outlet release scenario. Dams are ranked as high, moderate, or low likelihood for outlet releases to cause conditions that could require an emergency response to reduce potential downstream consequences. The ranking is based on a statewide database of high hazard dams that includes 441 high hazard dams that have been analyzed by the Colorado DNR for this aspect of dam incident flooding. The high, moderate, or low designations were assigned by DNR by dividing the total number of ranked dams across the state into thirds. Should there be a need to relieve pressure on the

dam (e.g., if there was excess inflow from high rains or snowmelt) releases from the dams ranked as high or moderate may result in downstream flooding. The following dams are owned by Denver Water are within or upstream of Jefferson County and have a risk of non-failure inundation.

Table R-6 Denver Water Dams with Risk of Non-Failure Inundation

Dam ID	Dam Name	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
800102	Cheesman	2,382	137	High
070224	Ralston	650	8	High
080401	Strontia Springs	4,000	59	High
090115	Harriman	63	323	Low
070114	Upper Long Lake	61	367	Low

Source: State of Colorado Department of Natural Resources, Dam Safety Division

Development Trends

Flooding due to a dam failure event is likely to exceed the special flood hazard areas regulated through local floodplain ordinances. Denver Water should work with municipalities that are considering permitting development downstream of the high and significant hazard dams in Jefferson County. Low hazard dams could become significant or high hazard dams if development occurs below them. Regular monitoring of dams, exercising and updating of EAPs, and rapid response to problems when detected at dams are ways to mitigate the potential impacts of these rare, but potentially catastrophic, events.

Flood: 100/500-Year

The Planning Area, including Denver Water's service area within the County, is prone to very intense rainfall. Floods have resulted from storms covering large areas with heavy general rainfall as well as from storms covering small area with extremely intense rainfall.

Development Trends

The risk of flooding to future development can be minimized through flood ordinances and zoning. The individual municipalities ultimately have authority over these ordinances. Denver Water can utilize GIS mapping and floodplain mapping to ensure that future facilities are located outside of flood hazard areas.

Wildfire

Watersheds and the numerous associated reservoirs in Denver Water's service area in Jefferson County could be significantly impacted by high severity wildfire. 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.

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.

Large wildfires have occurred in Denver Water's service area in Jefferson County. From May 21-29, 2002, the Schoonover Fire burned 23 acres of Denver Water property near Cheesman Reservoir. In June of that same year, the Hayman Fire burned 4,245 acres of Denver Water property. More recently, the Foothills Fire burned four acres of Denver Water property near the Foothills Water Treatment Plant on July 4, 2014.

Development Trends

Continued growth of Jefferson County's population will generally mean an expanded WUI and potential exposure of buildings, water infrastructure, and people. Additional water infrastructure in the WUI should be built with fire resistance in mind.

R.5.2 Growth and Development Trends

Denver Water does not have authority to manage growth or development within its district. As the population continues to grow in Jefferson County and throughout the Front Range, so too will the demand for water growth and reliance on Denver Water assets, particularly during times of drought.

R.6 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.

R.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table R-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 Denver Water. Many of the regulatory capabilities used by local jurisdictions are not applicable to Denver Water.

Table R-7 Denver 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	
Other special purpose ordinance (stormwater, steep slope, wildfire)	N/A	
Building code	N/A	
Fire department ISO rating	N/A	
Erosion or sediment control program	N/A	
Stormwater management program	N/A	
Site plan review requirements	N/A	
Capital improvements plan	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	Yes	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	

R.6.2 Administrative/Technical Mitigation Capabilities

Table R-8 identifies the personnel responsible for activities related to mitigation and loss prevention in Denver Water.

Table R-8 Denver Water—Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
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	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.

R.6.3 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 R-9 lists financial tools or resources that Denver Water could or already does use to help fund mitigation activities. Denver Water has received funding for forest management and watershed health improvements through the Colorado State Forest Service and U.S. Forest Service (USFS).

Table R-9 Denver Water Fiscal Mitigation Capabilities

Financial Resources	Accessible/ Eligible to Use (Yes/No)	Has this Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	No	N/A	
Capital improvements project funding	Yes	Yes	
Authority to levy taxes for specific purposes	Yes	Yes	For water rates only
Fees for water, sewer, gas, or electric services	Yes	Yes	
Impact fees for new development	Yes	Yes	Tapping Fees

Financial Resources	Accessible/ Eligible to Use (Yes/No)	Has this Been Used for Mitigation in the Past?	Comments
Incur debt through general obligation bonds	Yes	Yes	
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	

R.6.4 Mitigation Outreach and Partnerships

Denver Water has various outreach and partnerships including 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. 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 staff participates in the Jefferson County Wildfire Risk Reduction Task Force.
- Denver Water’s From Forests to Faucets Partnership with the US Forest Service, Colorado State Forest Service, and the Natural Resources Conservation Service which funds hazardous fuels reduction and mitigation projects in Denver Water’s watersheds.

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.

Table R-10 Education and Outreach Capabilities

Financial Resources	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	N/A
Firewise	N/A
StormReady	N/A
Other?	Refer to list above

R.6.5 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 Denver Water 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.

R.7 Plan Implementation and Maintenance

Denver Water has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how Denver Water will continue public participation in the plan maintenance process.

R.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

Denver Water recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example,

- Keep an updated drought management plan.
- Updated flood inundation maps according to Dam Safety plan.
- Completed training and exercises at the dams and treatment plants in designated jurisdiction.
- Continued on our watershed management program.

R.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by Denver Water to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

Denver Water's Emergency Management Program will be the primary group that interfaces with the local emergency management teams. Each of the designated program areas (i.e., watershed management, drought committee, dams safety, etc.) will be responsible for monitoring, evaluating, and updating the worksheets and will review this plan using the process outlined in Section 6 of the Base Plan. Denver Water Emergency Management Program will also be responsible for representing Denver Water in future Jefferson County HMPC meetings, and for coordination with Denver Water staff during plan updates. Denver Water staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the Denver Water Board.

Denver Water will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

R.8 Mitigation Strategy

Denver Water has adopted the hazard mitigation goals and objectives developed by the HMPC and described in the Mitigation Strategy section.

Denver Water had six mitigation actions in the 2016 Plan, and has completed two of them:

- Flood inundation maps.
- Training/exercising at Foothills Treatment Plant

One additional action was deemed to be no longer relevant and deleted:

- Sediment removal from Strontia Springs Dam – this effort is ongoing but is considered a maintenance activity that does not relate directly to a dam failure or other hazard.

The remaining actions have been carried over into the 2021 Plan, along with one new action.

Denver Water has partnered with local emergency management agencies to participate in local emergency management programs, including planning (i.e., hazard mitigation planning), training and exercises, response, recovery and mitigation efforts. Denver Water has incorporated the FEMA process for plan development including after-action reviews and improvement items all to enhance the planning, response and mitigation efforts in order to build a resilient utility.

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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation

Table R-11 Denver Water Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Denver Water 1	Watershed protection. Continue with the From Forests to Faucets Partnership with United State Forest Service (USFS), Colorado State Forest Service, and Natural Resources Conservation Service. This project entails forest hazardous fuels reduction in the Pike National Forest and is based on contract acreage with the USFS. The Pike National Forest includes Jefferson, Douglas, Teller and Park counties. There will be over 25,000 acres treated in this project. Benefits include Reduce potential frequency and magnitude of wildfires in project area	Wildfire	2; FWS	Denver Water	- Internal	High	Ongoing.	In Progress “forest treatments on federal and non-federal lands in Jefferson County through the Upper South Platte Partnership and the From Forests to Faucets Partnership”.
Denver Water 2	Public education and outreach. Continue with public education and outreach efforts on dam safety, water conservation, drought, etc. Producing presentations, brochures, etc. Benefits include Pre-planning and response coordination	Dam Failure, Drought	1,3; FWS	Denver Water	Low; Internal	Medium	Ongoing.	Annual Implementation We continually develop messages and stories through all of our communication channels on these topics.
Denver Water 3	Defensible space in Waterton Canyon. To establish defensible space around critical infrastructure on Denver Water properties located in Waterton Canyon. Benefits include Reduce wildfire risk and magnitude	Wildfire	2; FWS	Denver Water	\$10,000; Internal	Low	Ongoing.	Annual Implementation Continue as an annual maintenance project to maintain defensible space around facilities
Denver Water 4	Watershed Program: Sediment Management Plan. Denver Water is developing a sustainable watershed sediment management plan to explore partnerships and identify projects that reduce sediment transport to Strontia Springs Reservoir. The focus area for projects in Jefferson County will be the watersheds draining to the South Platte upstream of Strontia Springs	Flood, Wildfire	1,2,3; FWS	Denver Water; USFS and CSFS	\$220,000; Denver Water budget.	High	TBD	New in 2021

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	Reservoir and below Cheesman Reservoir, including all watersheds within the North Fork of the South Platte. Will benefit forest health, and sediment issues dealing with dam storage and water quality							



Annex S. Lookout Mountain Water District

S.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The Lookout Mountain Water District fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section A.9. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

S.2 Community Profile

Lookout Mountain Water District (LMWD) is a Special District as governed by Title 32 of the Colorado Revised Statutes. In terms of a system, it is comprised of tap owners and property owners included in the District's boundaries, the Board of Directors, and the contractors and consultants who provide operation and management. The District is managed by a five member board of directors. It has no employees. Operations are handled by a contracted secretary-administrator and a contracted operations manager. Its assets include the land, rights to water within its reservoirs, a treatment facility, and components of the distribution system, such as the main pipeline and meters. Water from LMWD is distributed to about 500 households, governmental agencies and businesses by gravity flows. The District serves treated water through a 14 to 20 inch diameter pipeline owned by LWMD, and several branch lines, variously owned throughout the District's extent. See Figure S-1 for a map of the District's service area.

S.2.1 Growth and Development Trends

Continuing residential development on Lookout Mountain has increased need for more fire hydrants and better lateral pipelines to supply them water. Global warming has increased the likelihood of early snowmelt runoff occurring before free river on Clear Creek, increasing the need for the District to acquire senior water rights on Clear Creek to enable Upper Beaver Brook reservoir to fill every year.

S.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the Lookout Mountain Water District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction and special district was in support of the main hazard summary identified in the base plan; however, the hazard summary for each annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the District's risk and vulnerabilities from that of the overall County. Table S-1 summarizes the Lookout Mountain Water District's hazards. For the 2021 plan update, the Lookout Mountain Water District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table S-1 is based on Lookout Mountain Water District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Lookout Mountain Water District are cyber attack, dam failure, drought, flood, and wildfire.

Figure S-1 Lookout Mountain Water District Service Area

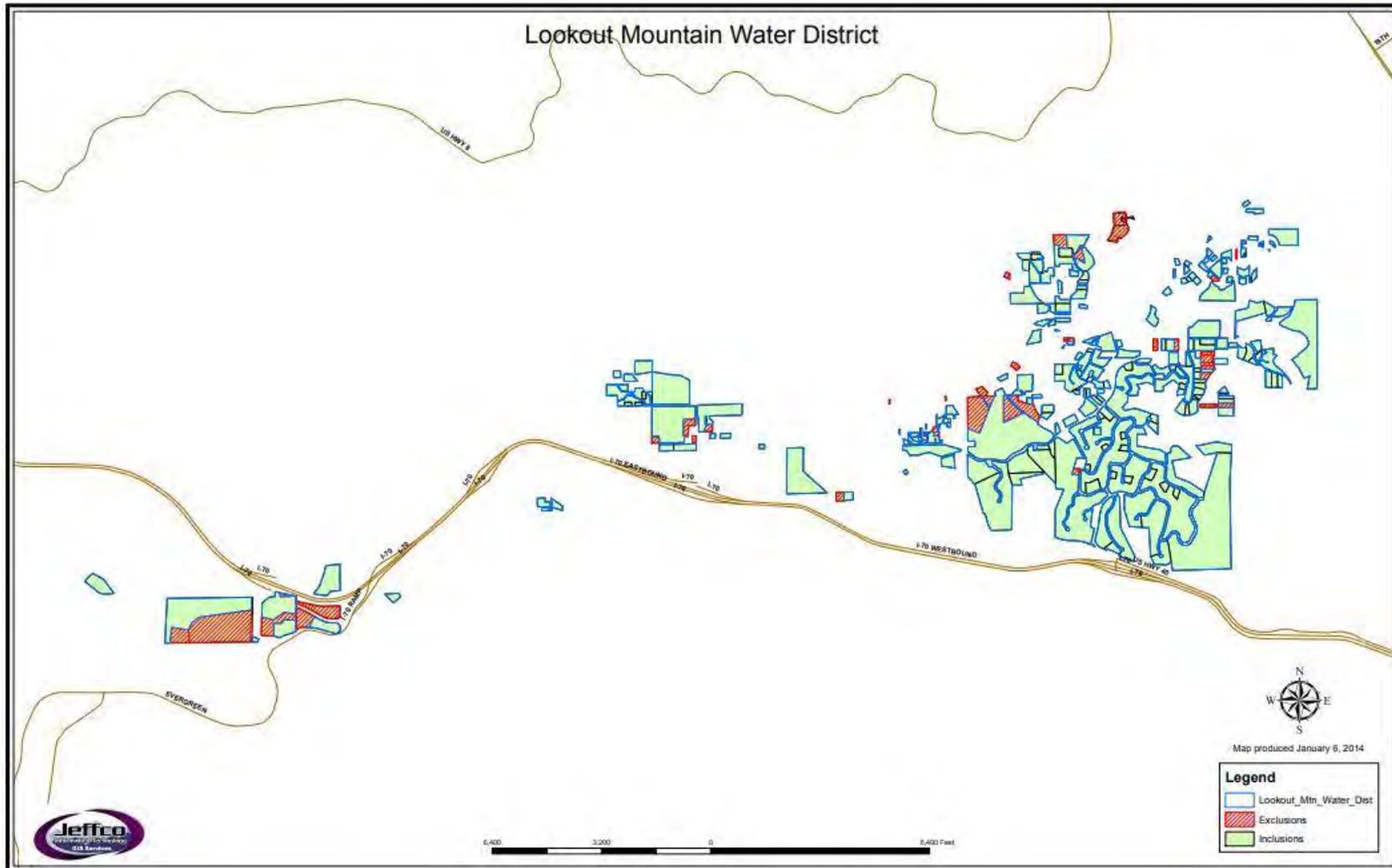




Table S-1 Golden Gate Fire Protection District – Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Unlikely	Limited	Limited	Low
Cyber Attack	Extensive	Unlikely	Critical	High
Dam Failure	Unlikely	Limited	Limited	High
Drought	Likely	Extensive	Catastrophic	High
Earthquake	Unlikely	Limited	Limited	Low
Erosion and Deposition	Occasional	Limited	Limited	Low
Expansive Soils	Occasional	Limited	Limited	Low
Extreme Temperatures	Occasional	Extensive	Limited	Low
Flood	Occasional	Limited	Limited	High
Hailstorm	Highly Likely	Extensive	Negligible	Medium
Landslide, Debris flow, Rockfall	Likely	Limited	Negligible	Low
Lightning	Highly Likely	Significant	Limited	Low
Pandemic	Extensive	Occasional	Negligible	Low
Severe Winter Storms	Highly Likely	Extensive	Limited	Medium
Subsidence	Occasional	Limited	Negligible	Low
Tornado	Occasional	Limited	Critical	Low
Wildfire	Highly Likely	Significant	Critical	High
Windstorm	Highly Likely	Significant	Limited	Low

<p>Geographic Extent</p> <p><u>Negligible</u>: Less than 10 percent of planning area or isolated single-point occurrences</p> <p><u>Limited</u>: 10 to 25 percent of the planning area or limited single-point occurrences</p> <p><u>Significant</u>: 25 to 75 percent of planning area or frequent single-point occurrences</p> <p><u>Extensive</u>: 75 to 100 percent of planning area or consistent single-point occurrences</p> <p>Potential Magnitude/Severity</p> <p><u>Negligible</u>: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.</p> <p><u>Limited</u>: 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.</p> <p><u>Critical</u>: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.</p> <p><u>Catastrophic</u>: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.</p>	<p>Probability of Future Occurrences</p> <p><u>Unlikely</u>: Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.</p> <p><u>Occasional</u>: Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.</p> <p><u>Likely</u>: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years</p> <p><u>Highly Likely</u>: Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.</p> <p>Overall Significance</p> <p><u>Low</u>: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential.</p> <p><u>Medium</u>: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating.</p> <p><u>High</u>: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.</p>
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S.4 District Assets

Table S-2 lists District owned or maintained assets important to protect in the event of a disaster.

Table S-2 Lookout Mountain Water District's Assets

Name of Asset	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Upper Beaver Brook reservoir & dam	\$10 million		
Lower Beaver Brook reservoir & dam	\$10 million		
LMWD water treatment plant	\$5 million		
LMWD main pipeline	\$20 million		
Lookout Mountain Water District Storage Tank	\$3 million	1 million gallons of potable water	
Lookout Mountain Dam	\$10 million		

Source: HMPC

S.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separately from that of the County as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the Lookout Mountain Water District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District's risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Earthquake
- Erosion and Deposition
- Expansive Soil
- Extreme Temperatures
- Hailstorm
- Landslide
- Tornado
- Pandemic/Public Health
- Windstorm
- Winter Storm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

S.5.1 Dam Failure

LMWD owns and operates 2 storage dams for water supply purposes and one for augmentation. Two are located in Clear Creek County, and one is located in Jefferson County. Lookout Mountain Dam is profiled in Table 4-11 in Section 4.3.3. All three of these dams are classified as high hazard dams. Two dams are used for water supply purposes for the District, and one is used for augmentation. Each dam has an emergency action plan (EAP). The Lookout Mountain dam is above Golden. The water held by the dam is released by the District for water rights purposes. Normally there is less than 80 acre feet of water stored in the reservoir. There are no structures below the dam until after the water flows beyond Highway US 6, which is significantly below the dam. The Lookout Mountain Reservoir Dam had a discharge pipe misalignment in 1974. This problem was corrected by sliplining and no further problems have occurred.

S.5.2 Drought

With its semiarid conditions, drought is a natural part of the Colorado climate cycle. The drought issue is further compounded by water rights specific to a region. A reduction in water quality deterioration is a problem related to drought, as well as the speed at which dead and fallen trees dry out and become particularly dangerous as fuel sources in wildfires. Drought may also weaken trees in areas already affected by mountain pine beetle infestations. An ongoing drought which inhibits natural plant growth cycles may increase susceptibility of the area to wildfire for a period of time. Drought impacts increase with the length of a drought. A multi-year drought could impact the District's ability to provide water in the service area, as storage capacity in the District's reservoirs along Beaver Brook is limited. Since LMWD is



the only source of water for over 500 homes and businesses, a prolonged drought that dries out the system would be a catastrophe.

S.5.3 Flooding

According to the LMWD, flooding affects the LMWD in elevation ranges from 11,500 feet on Squaw Mountain to 7,200 feet on the western extent of the District. The District is hampered in identifying a total of flood-prone areas by repeated cross-drainage topography and diversion points which intersect overland flows. The flood pattern is generally confined from the lower Beaver Brook Dam, along Beaver Brook, until its confluence with Clear Creek, near Tunnel 2 on Highway 6, well north of the District’s service area in Jefferson County.

S.5.4 Wildfire

Wildfire in and around the District can cause erosion and sedimentation, which would adversely impact source water quality. Specifically, the district has noted how increased and continued residential housing development in the wildland urban interface presents an increased risk for losses and infrastructure damage in the event of a wildfire.

S.6 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.

S.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table S-3 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place. Many of the regulatory capabilities used by local jurisdictions are not applicable to LMWD.

Table S-3 Lookout Mountain Water District’s Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General or Comprehensive plan	No	
Zoning ordinance	No	
Subdivision ordinance	No	
Growth management ordinance	No	
Floodplain ordinance	No	
Floodplain Management Plan	No	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Dam Safety (EAPs)
Building code	No	
Fire department ISO rating	No	
Erosion or sediment control program	No	
Stormwater management program	No	
Site plan review requirements	No	
Capital improvements plan	Yes	Long Range Plan Prepared
Economic development plan	No	
Local emergency operations plan	No	
Other special plans	No	
Flood insurance study or other engineering study for streams	No	
Elevation certificates (for floodplain development)	No	
BCEGS Ratings (1-10)	No	
Community Wildfire Protection Plan (CWPP)	No	Working with FFPD

Lookout Mountain Water District structures their rates for conservation. Water restrictions are implemented when needed.

S.6.2 Administrative/Technical Mitigation Capabilities

Table S-4 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the District.



Table S-4 Lookout Mountain Water District's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	No		
Planner/engineer/scientist with an understanding of natural hazards	No		
Resiliency Planner	Yes	Consultant	Working with Consultant, Momentum Engineering
Transportation Planner	No		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No		
Personnel skilled in GIS	Yes	District Engineer	Acquired GIS capability
Full time building official	No		
Floodplain manager	No		
Emergency manager	No		
Grant writer	Yes	Board member/consultant	Working with Consultant, Momentum Engineering
Other personnel	No		
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes		Acquired GIS capability
Warning Systems/Services (Reverse 9-11,	No		

S.6.3 Fiscal Mitigation Capabilities

Table S-5 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table S-5 Lookout Mountain Water District's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	Yes	Yes	Received local Grants to add SCADA System to Upper Beaver Brook, improve controls on water releases
Capital improvements project funding	Yes	Yes	none
Authority to levy taxes for specific purposes	Yes	Yes	De-Gallagher vote in 2020
Fees for water, sewer, gas, or electric services	Yes	Yes	Annual 3% increase
Impact fees for new development	No	No	none
Incur debt through general obligation bonds	Yes	Yes	CWCB loans for expansion and improvements of Upper Beaver Brook Reservoir and replacement of Lower Beaver Brook dam
Incur debt through special tax bonds	No	No	none
Incur debt through private activities	No	No	None
Withhold spending in hazard prone areas	No	No	none
Stormwater Service Fees	No	No	none



S.6.4 Mitigation Outreach and Partnerships

Table S-6 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table S-6 Lookout Mountain Water District’s Education and Outreach Mitigation Capabilities

Financial Resources	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Yes; Zoom community drought meeting
Firewise	Yes; working with FFPD
StormReady	No
Other outreach	The District also conducts ongoing conservation outreach for its clients.

S.6.5 Opportunities for Enhancement

Based on the capability assessment, Lookout Mountain Water District has several existing mechanisms in place that already help to mitigate hazards. Continuing to expand the education and involving more stake holders will create a safer WUI area and lead to significantly less damage when the next WUI fire occurs.

LMWD has a good working relationship with the Foothills FPD (FFPD) and is working with FFPD on the development of a Firewise plan and a plan to expand the number and capacity of fire hydrants on Lookout Mountain to enable better firefighting capabilities.

S.7 Plan Implementation and Maintenance

Lookout Mountain Water District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

S.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

Lookout Mountain Water District recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms. For example, the District completed the expansion of the Upper Beaver Brook reservoir in 2017, increasing its storage capacity by almost 55% with the help of a CWCB loan. The District is currently replacing the Lower Beaver Brook dam with the help of a \$4.4 million FEMA grant and additional funding from the CWCB. Lack of additional funding has prevented any new upgrades to the lateral distribution and fire hydrant system.

S.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The District Vice President will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Vice President will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.



S.8 Mitigation Strategy

Lookout Mountain Water District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in the Mitigation Strategy section.

Lookout Mountain Water District had six mitigation actions in the 2016 Plan, and has completed one of them:

- Expand storage capacity at upper Beaver Brook reservoir

The remaining actions have been carried over into the 2021 Plan, along with six new actions.

In addition to the actions listed in the 2016 Plan, meters on lateral line connections have been installed. Also the level of the Upper Brook Reservoir was raised 10' in 2017 adding 150 AF to LMWD water storage capacity to improve drought resistance; lack of senior water rights on Clear Creek has prevented that this additional storage capacity from filling.

The District 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation



Table S-7 Lookout Mountain Water District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Lookout Mountain Water 1	Conduct a Leak Detection Survey. A leak detection survey is needed along 48,000 linear feet of the main pipeline and the lateral pipelines served by it. In 2009, the Water Commissioner ordered a payback of 117 acre feet of water that the District consumed over the 2008-2009 winter season, but was not legally entitled to. About 33 acre feet of the 117 acre feet was due to leaks in the distribution pipelines that have been repaired once located (325,851 gallons = 1 acre foot). Benefits include The District would maintain higher water levels in each reservoir, keeping more water available in the event of drought.	Drought	2	Lookout Mountain Water District	To be determined. -	Medium	Within 5 years.	Annual Implementation Lack of funds preventing progress
Lookout Mountain Water 2	Modify or replace Lookout Mountain Dam. Lookout Mountain Dam was constructed in 1903 as a holding basin for the City of Golden water system. The dam and its reservoir no longer perform this function and are used for augmentation/exchange on Clear Creek. Due to operating and legal inefficiencies, this dam needs upgrades and a relocation of its water discharge to a point upstream of the intakes of superior water rights holders. Benefits include avoid the need to purchase water for release in drought years.	Drought, Flood	2	LMWD	\$1-10 million CWCB, FEMA	Medium	5 – 10 years	Not Started Funding and additional water rights required
Lookout Mountain Water 3	Repair or replace Lower Beaver Brook (LBB) Dam. The Lower Beaver Brook dam has been identified as having deficiencies due to changing Colorado state standards and the addition of fulltime downstream residents. The state engineer and LMWD are in discussions about the scope of the repairs and their timetable.	Drought, Flood	2,3	Lookout Mountain Water District	\$1-10 million FEMA, CWCB	High	within 5-10 years	In Progress State demands dam replacement or removal



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
	Benefits: continued use of a critical infrastructure component.							
Lookout Mountain Water 4	Upgrade water distribution lateral pipelines on Lookout Mountain with additional hydrants to improve wildfire fighting capabilities. Aside from the LMWD main water pipeline, less than half of the lateral pipelines that distribute water into the neighborhoods of Lookout Mountain are capable of supplying enough water to fight a large wildfire and/or to provide structure protection during a wildfire event. In other words, hydrants cannot be supported where needed. These lateral pipelines should be upgraded from their current undersized 1 to 4" diameter to 8" diameter pipe. Some additional lines will also be needed for underserved areas. These undersized distribution lines have a combined total length of over 9 miles. Hydrants will need to be installed at recommended intervals along the new or upgraded pipelines. Benefits: \$+500 million (estimated value of structures on Lookout Mountain) + value of lives saved	Wildfire	2	LMWD	\$5-9 million FEMA	High	within 5-10 years	Not Started Lack of funds preventing progress
Lookout Mountain Water 5	Renovation and Replacement of Sections of the Main Pipeline. The infrastructure of LMWD is aging and is in need of updating. Infrastructure costs are quite large, while the District is small, and has very limited opportunities to expand. Annual renovations and improvements will allow the District to increase efficiency over time. Benefits include Leaks that are not detectable because of cracks in the aged line will be fixed. This will lead to greater efficiency in the water delivery structure and will aid the district during times of low reservoir levels.	Drought	2,3	Lookout Mountain Water District	To be determined -	High	Annually, dependent on fund availability	Annual Implementation Piecemeal replacement until more funding is available



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Lookout Mountain Water 6	Improve drought resistance. Secure 100 AF senior water rights on Clear Creek: will allow District to retain annual snow-melt in system reservoirs by exchange into Clear Creek; District customers use about 100AF/year, so 100AF of senior water rights will drought proof the District. Rehabilitate the Golden Emergency Pipeline in Clear Creek County to transfer 0.5 cfs under a 1910 water right from Little Bear Creek into Beaver Brook.	Drought; Wildfire;	1; 2; 3; FWS; S&S;	Lookout Mountain Water District	More than \$1,000,000; FEMA grants	High	Annually, dependent on funding and availability	New in 2021
Lookout Mountain Water 7	Source Water Protection Plan. Prepare Source Water Protection Plan for fire mitigation around reservoirs and treatment plant; plan needed to highlight mitigation actions to prevent wildfire runoff that could contaminate reservoirs and destroy/foul water treatment plant.	Drought; Wildfire	1; 2; 3; H&M; FWS; S&S	Lookout Mountain Water District	\$10,000 - \$100,000; grants	High	next 5 years	New in 2021
Lookout Mountain Water 8	Outlet works valve replacement. Replace 90 year old outlet valve and upgrade outlet works at Upper Beaver Brook (UBB) dam; old valve presents high risk of failure that could quickly drain the main system reservoir of all stored water, depriving 500 homes of drinking water and all of Lookout Mountain of water to fight wildfires; a new valve will eliminate reservoir drainage risk and allow more accurate water releases, maximizing the ability of the District to store water in Upper Beaver Brook reservoir during drought conditions.	Dam Failure; Drought; Wildfire	1; 2; 3; FWS; S&S	Lookout Mountain Water District	\$100,000 - \$1,000,000; WRSF Grant & FEMA grants	High	2021	New in 2021
Lookout Mountain Water 9	SCADA system installation. Install SCADA system to control releases from Upper Beaver Brook reservoir & Lower Beaver Brook reservoir; control system will prevent unnecessary water releases from both reservoirs and maximize water storage and retention during drought conditions.	Drought; Wildfire	1; 2; 3; FWS; S&S	Lookout Mountain Water District	\$10,000 - \$100,000; WRSF Grant & FEMA grants	High	2021	New in 2021



Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Lookout Mountain Water 10	Additional filter skid to water treatment plant. Adding an additional filter skid to the existing water treatment plant will increase the District's ability to produce treated water by 33%; increased water production capability will improve the District's ability to supply water during a wildfire emergency and allow additional water to be stored in Lookout Mountain reservoir for exchange to Clear Creek, enabling more water to be stored in Upper Beaver Brook reservoir and improving drought resistance	Drought; Wildfire	1; 2; 3; FWS; S&S	Lookout Mountain Water District	\$100,000 - \$1,000,000; FEMA grants	High	next 10 years	New in 2021
Lookout Mountain Water 11	Rehabilitate the old Golden Emergency pipeline. The core of the LMWD is the original Golden municipal water supply based on 2 reservoirs on Beaver Brook in Clear Creek County. The natural flow of Beaver Brook was augmented in the 1930's by the Golden Emergency pipeline, which Golden built to divert water from Little Bear Creek into the headwaters of Beaver Brook. That pipeline is severed in several places and needs to be completely rebuilt. When rebuilt the pipeline could supply an average of 37 AF/yr. into the LMWD system.	Drought; Wildfire	2; 3; FWS; S&S	Lookout Mountain Water District	\$100,000 - \$1,000,000; LMWD budget, FEMA grants	High	5-10 yrs.	New in 2021

Annex T. Jefferson Conservation District

T.1 Background and Planning Process

This Annex was updated during the development of the 2021 Jefferson County Hazard Mitigation Plan. The Jefferson Conservation District fully participated in the 2021 update process as described in Section 3. The District had previously participated in the 2016 Jefferson County Hazard Mitigation Plan and has been active in implementing that plan as described in Section T.8. A review of jurisdictional priorities found no significant changes in priorities since the last update. Individuals who participated in the update process and represented the District on the Planning Team are listed in Appendix B.

More details on the planning process and how the jurisdictions, special districts, and stakeholders participated, as well as how the public was involved, can be found in Chapter 3 of the Base Plan.

T.2 Community Profile

The Jefferson Conservation District was formed in 1942 and is located west of Denver, and includes unincorporated Jefferson County. The District includes the plains grasslands and forested foothills where significant development exists, which increases the wildfire risks in those regions. JCD serves a population of over 240,000 residents and focuses on wildfire mitigation, forest health, source water protection, urban agriculture, and noxious weed eradication.

The conservation district model was created as part of the response to the ecological crisis of the 1930s known as the Dust Bowl. The success of the conservation district model lies in providing technical assistance to private landowners who are willing to undertake an active, voluntary role in the stewardship of their land. Though originally focused on erosion control, today's conservation districts address a broad array of natural resource issues on private lands.

The powers and duties of conservation districts differ from other special districts. The Jefferson Conservation District (JCD) has the responsibility to manage resources in the county in a way that preserves the environment and protects local communities, specifically through its work with voluntary private landowners.

T.2.1 Growth and Development Trends

Continuing residential development on Lookout Mountain has increased need for more fire hydrants and better lateral pipelines to supply them water. Global warming has increased likelihood of early snowmelt runoff occurring before free river on Clear Creek. See Section 2.6 for growth and development trends in unincorporated Jefferson County

T.3 Hazard Identification and Risk Assessment

A hazard identification and vulnerability analysis was completed for the Jefferson Conservation District using the same methodology in the base plan. The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide.

Each participating jurisdiction and special district was in support of the main hazard summary identified in the base plan; however, the hazard summary for each annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. This helps to differentiate the District's risk and vulnerabilities from that of the overall County. Table T-1 summarizes the Jefferson Conservation District's hazards. For the 2021 plan update, the Jefferson Conservation District's planning team members were asked to revisit and validate or update the matrix based on the current experience and perspective of the district.

The hazard significance listed in Table T-1 is based on Jefferson Conservation District HMPC member input and the risk assessment developed during the planning process (refer to Chapter 4 of the base plan). Based on this the most significant hazards for the Jefferson Conservation District are hailstorm, severe winter storm, and wildfire.

Table T-1 Jefferson Conservation District – Hazard Summaries

Hazard	Geographic Extent	Potential of Future Occurrence	Potential Severity Magnitude	Overall Significance
Avalanche	Negligible/Limited	Unlikely	Negligible	Low
Cyber Attack	Limited	Likely	Limited	Low
Dam Failure	Significant	Occasional	Critical	High
Drought	Extensive	Likely	Limited	Medium
Earthquake	Significant	Unlikely	Catastrophic	Medium
Erosion and Deposition	Significant	Likely	Critical	Medium
Expansive Soils	Extensive	Likely	Limited	Medium
Extreme Temperatures	Extensive	Likely	Limited	Low
Flood	Limited	Likely	Critical	Medium
Hailstorm	Significant	Likely	Critical	High
Landslide, Debris flow, Rockfall	Limited	Likely	Negligible	Medium
Lightning	Limited	Highly Likely	Critical	Medium
Pandemic	Limited	Occasional	Limited	Low
Severe Winter Storms	Extensive	Likely	Critical	High
Subsidence	Limited	Occasional	Limited	Medium
Tornado	Limited	Likely	Limited	Medium
Wildfire	Significant	Likely	Critical	High
Windstorm	Extensive	Likely	Negligible	Medium
Geographic Extent <u>Negligible:</u> Less than 10 percent of planning area or isolated single-point occurrences <u>Limited:</u> 10 to 25 percent of the planning area or limited single-point occurrences <u>Significant:</u> 25 to 75 percent of planning area or frequent single-point occurrences <u>Extensive:</u> 75 to 100 percent of planning area or consistent single-point occurrences Potential Magnitude/Severity <u>Negligible:</u> Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction. <u>Limited:</u> 10 to 25 percent of property is severely damaged, facilities and services are unavailable for between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities. <u>Critical:</u> 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths. <u>Catastrophic:</u> More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.		Probability of Future Occurrences <u>Unlikely:</u> Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years. <u>Occasional:</u> Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <u>Likely:</u> Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years <u>Highly Likely:</u> Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year. Overall Significance <u>Low:</u> Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences and impacts or for hazards with minimal mitigation potential. <u>Medium:</u> The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating. <u>High:</u> The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.		

T.4 District Asset Inventory

Table T-2 lists District owned or maintained assets important to protect in the event of a disaster.

Table T-2 Jefferson Conservation District Critical Facilities and Other Community Assets

Name of Asset	Replacement value	Occupancy/capacity**	Hazard Specific issues
Admin. Building	Unknown		Earthquake, Expansive Soils, Hailstorm, Tornado

Source: HMPC

T.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separately from that of the County as a whole, which has already been addressed in the Vulnerability Assessment in the main plan. For more information about how hazards affect the County, see the Risk Assessment in Chapter 4.

This section provides a refined vulnerability assessment, specific for the Jefferson Conservation District, for those hazards where the risk is significantly different from that of Jefferson County overall, or where sufficient data exists to conduct mapping and analysis at the local level. For the following hazards, the District's risk does not differ significantly from the rest of the County, and they are not profiled further:

- Avalanche
- Cyber Attack
- Dam Failure
- Earthquake
- Extreme Temperatures
- Flood
- Hailstorm
- Lightning
- Pandemic/Public Health
- Winter Storm
- Tornado
- Windstorm

For more information about how hazards affect Jefferson County, see Section 4 (Risk Assessment) of the Base Plan.

T.5.1 Drought - Medium Hazard Significance

Future Development

Drought vulnerability will increase with future development, as there will be increased demands for limited water resources. Future growth in the unincorporated areas will mean more wells and more demands on limited groundwater and surface water resources.

In 2000, the USGS in conjunction with Jefferson County completed a study of mountain ground water resources in the Turkey Creek watershed. To achieve a balance between development and available water, the county created a zoning overlay district that regulates land uses in order to protect ground water supplies in the mountains.

T.5.2 Erosion and Deposition – Medium Hazard Significance

Future Development

JCD, and the Colorado Geological Survey, developed maps and GIS layers of areas with highly erodible soil, highly sensitive soil (thin soil not easily reclaimed when disturbed) and areas prone to postfire flooding and mudflows. JCD and CGS also developed associated land-use policies.

If policies are followed, future development should be protected from erosion and deposition hazards. When development is proposed, studies are required to determine the extent of potential hazards; extensive mitigation may be required. JCD reviews new subdivision plans for erosion and deposition constraints and makes recommendations to Jefferson County for the elimination or mitigation of hazards.

T.5.3 Expansive Soils – Medium Hazard Significance

Existing Development

Two types of expansive materials are present within the District: Expansive soil and steeply dipping expansive bedrock. Both hazards are widely found in the plains but are rarely found in mountain areas. In

the past, home warranty companies paid more claims in Jefferson County than any other county in the nation, mostly due to dipping bedrock damages. The County's adoption of the Dipping Bedrock Overlay Zone District and associated subdivision regulations, in 1995, has greatly reduced damages from expansive bedrock.

Most damages from expansive soils and bedrock occur during the first 7 to 10 years after building construction; however, a change in soil moisture can cause damages to older structures. When drought occurs, expansive soil can shrink, and then swell again following precipitation or irrigation. An old water or sewer line may fail and saturate soil. Thus, damages to existing buildings, pavements, roads, and utilities will continue to occur but damage rates should be significantly less than those experienced prior to 1995.

Future Development

Implementation of existing land-use planning regulations should reduce the risk of expansive bedrock impacts on future development. Continued improvements in building codes and construction techniques should help reduce damages from expansive soil.

JCD and CGS developed a countywide GIS layer and map of expansive soils. JCD reviews new subdivision plans for expansive soil and makes recommendations to Jefferson County for the elimination or mitigation of hazards. New development will be evaluated for expansive soil and bedrock constraints. Education on the hazard, particularly in regards to landscaping and maintenance concerns, will be needed to continue to reduce expansive soil and bedrock hazards.

T.5.4 Landslides, Debris Flows, Rockfall - Medium Hazard Significance

Existing Development

Wildfire causes physical and chemical changes to mountain watersheds, resulting in hydrophobic soil, decreased transpiration, decreased infiltration, altered water chemistry, and increased runoff. After a fire, peak flow flood potential is 10 to 10,000 times greater than pre-fire levels.

Post fire erosion rates may be up to more 100 times greater than on a well-vegetated watershed (Radtko 1983). Sediment from increased erosion, clogs, dams and changes water courses; adding to flooding, mud floods and debris flow hazards.

Residents living directly downslope of mountainous wildfire areas should be aware of hazards-- debris flooding or mud flooding at and near the mouths of channels that drain burned-over, ashy slopes. JCD and CGS developed maps and GIS layers of areas prone to postfire hazards. This information can be used to help protect existing development following a fire.

Future Development

In addition to postfire mud flow and debris flow maps; JCD and CGS also developed associated land-use policies. The maps and land-use policies are included County comprehensive plans.

If policies are followed, future development should be better protected from postfire hazards. When development is proposed, studies are required to determine the extent of potential hazards; extensive mitigation may be required. JCD reviews new subdivision plans for erosion and deposition constraints and makes recommendations to Jefferson County for the elimination or mitigation of hazards.

T.5.5 Wildfire – High Hazard Significance

Existing Development

Since the District covers the entirety of unincorporated Jefferson County, all of the critical facilities and parcels/buildings in the WUI communities could be considered 'at-risk'. See the wildfire analysis in Section 4.3.16 of the Base Plan.

Community Wildfire Protection Plans (CWPP) have been developed for much of the County's wildland urban interface. Implementation of CWPPs should help protect existing development. However, the cost of implementation greatly exceeds existing resources. Even with the increase in the frequency, severity, and extent of wildfires, many private landowners are still reluctant to cut and thin trees. Continued public education is needed.

Future Development

Growth in the wildland urban interface has been significant in the past twenty years in Jefferson County. While this growth has recently slowed, there still remains potential for development of primary and secondary residences in wildfire hazard areas in the unincorporated County. Wildfire risk to future development in these areas will be tempered by the County’s land use regulations and implementation of CWPPs on a landscape scale.

JCD also helped develop the Community Wildfire Desk Guide and Toolkit - The NACD Community Wildfire Desk Guide and Toolkit are designed to be simple aids for use by conservation districts, communities and land managers. The desk guide provides information about mitigation activities prior to, during and after wildfire. Toolkit materials interact with and support this information and provide more thorough explanations and examples of activities.

T.6 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.

T.6.1 Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table T-3 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District. Many of the regulatory capabilities used by local jurisdictions are not applicable to the District.

Table T-3 Jefferson Conservation District — Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General or Comprehensive plan	Yes	4
Zoning ordinance	No	
Subdivision ordinance	Yes	1
Growth management ordinance	No	
Floodplain ordinance	No	1, 2
Floodplain Management Plan	No	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	1, 2
Building code	No	
Fire department ISO rating	No	
Erosion or sediment control program	Yes	1, 2
Stormwater management program	Yes	1, 2
Site plan review requirements	Yes	1, 2
Capital improvements plan	No	
Economic development plan	No	
Local emergency operations plan	Yes	3
Other special plans	No	
Flood insurance study or other engineering study for streams	No	
Elevation certificates (for floodplain development)	No	
Community Wildfire Protection Plan (CWPP)	Yes	Countywide and Fire Districts
1. Under C.R.S. § 30-28-136, the county must send subdivision applications to the conservation district for review and recommendations regarding soil suitability, flooding, and watershed protection 2. Under 1041 powers, C.R.S. § 24-65.1, et seq., conservation districts provide technical assistance to local governments concerning resource data inventories, soils, soil suitability, erosion and sedimentation, floodwater problems, and watershed protection. 3. The Jefferson Conservation District has been the sponsor for post-fire rehabilitation for the High Meadow and Buffalo Creek Fires under the NRCS Emergency Watershed Protection Program. 4. JCD created maps of areas with highly erodible soils, sensitive soils, expansive soils and unstable slopes for Jefferson County.		

T.6.2 Administrative/Technical Mitigation Capabilities

Table T-4 identifies the personnel responsible for activities related to mitigation and loss prevention for Jefferson Conservation District.

Table T-4 Jefferson Conservation District — Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Staff/Board	1
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No		1
Planner/engineer/scientist with an understanding of natural hazards	Yes	Staff/Board	1
Personnel skilled in GIS	Yes	Staff	
Full time building official	No		
Floodplain manager	No		
Emergency manager	No		
Grant writer	Yes	Staff/Board	
Other personnel	Yes	Staff Foresters/Wildfire Professionals	1
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	Staff	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No		
Resiliency Planner	No		
Transportation Planner	No		
1. JCD also has technical service agreements to use USDA Natural Resources Conservation Service Technical Staff			

T.6.3 Fiscal Mitigation Capabilities

Table T-5 Fiscal mitigation capabilities are financial tools or resources that Jefferson Conservation District could or already does use to help fund mitigation activities.

Table T-5 Jefferson Conservation District — Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has This Been Used for Mitigation in the Past?	Comments
Community Development Block Grants	No	No	
Capital improvements project funding	Yes	No	
Authority to levy taxes for specific purposes	Yes	No	Subject to voter approval
Fees for water, sewer, gas, or electric services	No	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	No	No	
Withhold spending in hazard prone areas	No	No	
Stormwater Service Fees	No	No	

T.6.4 Mitigation Outreach and Partnerships

Table T-6 identifies public education, outreach and other capabilities in place in the District for hazard mitigation.

Table T-6 Education and Outreach Mitigation Capabilities

Financial Resources	Yes/No (Briefly Describe)
Local Citizen Groups That Communicate Hazard Risks	Yes. Evergreen Rotary is active in wildfire mitigation
Firewise	Yes. Firewise resource available from CO State Forest Service and Firewise website
StormReady	No

Jefferson Conservation District conducts educational programs taught to residents, students, landowners, and other natural resources professionals. Particular programs include: Wildfire Mitigation and Forest Health, Post-Fire Erosion Control, Stormwater Management, Groundwater Protection, Source water Protection, Defensible Space, Soil Hazards, and Construction Erosion Control. Education from JCD happens organically and one on one as fuel reduction projects are developed with individual landowners.

The District participates in the Upper South Platte Partnership, a collaborative established in 2015 that include many local, state and federal partners operating in Jefferson County.

T.6.5 Opportunities for Enhancement

Based on the capability assessment, Jefferson Conservation District has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the District 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. Additional training opportunities will help to inform staff and board members on how best to integrate hazard information and mitigation projects into District policies and ongoing duties. Additional staffing to handle increased mitigation work would be critical.

T.7 Plan Implementation and Maintenance

Jefferson Conservation District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

T.7.1 Implementation and Maintenance of the 2016 Hazard Mitigation Plan

Jefferson Conservation District recognizes and acknowledges the importance of hazard mitigation and has worked to integrate and incorporate hazard information into existing planning mechanisms.

T.7.2 Monitoring, Evaluation and Updating the Plan

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of local plans, programs and policies, as described in Section 6 of the Base Plan.

The Director of Jefferson Conservation District will be responsible for monitoring, evaluating, and updating this plan using the process outlined in Section 6 of the Base Plan. The Director will also be responsible for representing the District on future Jefferson County HMPC meetings, and for coordination with district staff during plan updates. District staff will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the Denver Water Board.

The District will also continue to involve the public in mitigation, as described in Section 6.4 of the Base Plan. This will include posting information on the website and utilize marketing and communications to get information to citizens and businesses.

T.8 Mitigation Strategy

Jefferson Conservation District has adopted the hazard mitigation goals and objectives developed by the HMPC and described in the Mitigation Strategy section.

Jefferson Conservation District had three mitigation actions in the 2016 Plan, and has completed one of them:

- Last Resort Creek and Kennedy Gulch Fuels Reduction

The two remaining actions were deemed to be no longer relevant and deleted:

- Educate Homeowners on Wildfire Hazards and Mitigation
- Doubleheader Ranch Hazardous Fuels Reduction

One new action has been added for the 2021 Plan.

In addition to the actions in the 2016 Plan, 1,400 acres of fuel reduction has been completed since 2016.

Jefferson Conservation District 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.

Many of these mitigation actions are intended to reduce impacts to existing development as well as future development. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations. Actions that protect critical infrastructure note which lifeline category is protected using the following abbreviations:

COM: Communications

ENG: Energy

FWS: Food, Water, Sheltering

HAZ: Hazardous Waste

H&M: Health & Medical

S&S: Safety & Security

TRN: Transportation

Table T-7 Jefferson Conservation District Mitigation Action Plan

Number	Title and Description	Hazards Mitigated	Related Goals & Lifelines	Lead Agency & Partners	Cost Estimate & Potential Funding	Priority	Timeline	Status & Implementation Notes
Jefferson Conservation District 1	<p>JCD Fuels Reduction. JCD implements about 150-200 acres of hazardous wildland fire fuel reduction treatments per year on private lands in Jefferson County. That rate is expected to continue during the 2021-2026 life cycle of the next HMP; therefore, JCD's goal for that time period is a total of 700 acres treated. Treatments occur in a variety of locations across the county and therefore are considered multiple separate "projects" for JCD's purposes (due to the nature of the project management, funding, and contracting with loggers). But, for this HMP Mitigation Action, JCD's fuel reduction program of work should be considered a single item. Also, because work occurs on private lands, it is not known exactly what landowners will participate in the program beyond 1-2 years in the future.</p>	Wildfire;	1; 2; 3; S&S; FWS; H&M;	Jefferson Conservation District, various fire districts, Colorado State Forest Service	More than \$1,000,000 various state, federal, and private grants and contributions	High	End of 2025	New in 2021

STAFF MEMO

DATE OF COUNCIL MEETING: DECEMBER 13, 2021 / AGENDA ITEM NO. 9

To: Mayor and City Council

From: Jay N. Hutchison, Director of Public Works, 303-987-7901

Subject: **INTERGOVERNMENTAL AGREEMENT WITH THE MILE HIGH FLOOD DISTRICT AND THE CITY OF WHEAT RIDGE FOR FUNDING A MAJOR DRAINAGEWAY PLAN AND FLOOD HAZARD AREA DELINEATION FOR LENA GULCH INCLUDING ITS TRIBUTARY H**

SUMMARY STATEMENT: This resolution would authorize the City Manager to enter into an intergovernmental agreement (IGA) with the Mile High Flood District (MHFD) and the City of Wheat Ridge for the Lena Gulch, including its Tributary H, Major Drainageway Plan (MDP) and Flood Hazard Area Delineation (FHAD). A background presentation is available on Lakewood Speaks. Public Works recommends approval of the resolution.

BACKGROUND INFORMATION: Lena Gulch is a major drainageway that runs through the west side of Lakewood including portions of the Denver West Office Park near I-70 and Denver West Parkway and in the Applewood area east of Youngfield Street from approximately W 17th Avenue to W 32nd Avenue, including Maple Grove Reservoir. Please refer to the attached map.

Lena Gulch is included on MHFD's work program for an update of both the MDP and FHAD. Previous MDP and FHAD included Upper Lena Gulch prepared in 1994 and Lower Lena Gulch in 2007. The MDP will include updated hydrology and hydraulic modeling, alternatives assessments and a conceptual plan. The FHAD will identify and update flood risk potential and floodplain boundaries. Because portions of the Lena Gulch drainageway are within other jurisdictions, co-sponsors of these studies include Jefferson County and the cities of Golden and Wheat Ridge. Public involvement will include conducting a public meeting to gather input from residents and business owners adjacent to the drainageway during the preparation of the MDP and sending notifications to all property owners affected by a new or revised floodplain delineation.

The Lena Gulch FHAD will be funded entirely by the MHFD. Approximately half of the MDP cost will be funded by the MHFD, and the remaining amount will be divided among the co-sponsors and based on the approximate length of drainageway in each jurisdiction. Lakewood's share of the MDP is \$25,000 which is approximately 12% of the MDP cost. Jefferson County and the City of Golden are not parties to this particular IGA because they have entered into separate IGAs with the MHFD. The distribution of costs among all five parties is shown on Exhibit B of the IGA.

BUDGETARY IMPACTS: Adequate Stormwater Management Utility funds are available in the approved budget for this IGA.

STAFF RECOMMENDATION: Approval of the resolution.

ALTERNATIVES: City Council could choose to not approve the resolution resulting in Lakewood not participating in these joint studies with the MHFD, Jefferson County, Golden and Wheat Ridge. Without Lakewood's participation, the MDP and FHAD may be postponed until such time Lakewood would agree to participate with the other sponsors resulting in delay of the updates to the MDP and FHAD.

PUBLIC OUTREACH: Public outreach has occurred through notice of this resolution with the normal City Council meeting notifications and on the MHFD website where Lakewood is listed as a co-sponsor on MHFD's 5-year plan for updates to the Lena Gulch MDP and FHAD.

NEXT STEPS: The IGA will be executed and work will begin on the MDP and FHAD.

ATTACHMENTS: Resolution 2021-51
Map of Lena Gulch and Tributary H
Intergovernmental Agreement with MHFD

REVIEWED BY: Kathleen E. Hodgson, City Manager
Benjamin B. Goldstein, Deputy City Manager
Alison McKenney Brown, City Attorney

2021-51

A RESOLUTION

APPROVING AN INTERGOVERNMENTAL AGREEMENT WITH THE MILE HIGH FLOOD DISTRICT AND THE CITY OF WHEAT RIDGE FOR A MAJOR DRAINAGEWAY PLAN AND A FLOOD HAZARD AREA DELINEATION FOR LENA GULCH AND ITS TRIBUTARY H

WHEREAS, the City of Lakewood has enacted floodplain regulations, and

WHEREAS, the City of Lakewood wishes to cooperate with the Mile High Flood District and the City of Wheat Ridge to identify solutions to stormwater drainage and flood control management for Lena Gulch and its Tributary H by preparation of a Major Drainageway Plan and a Flood Hazard Area Delineation (the "Project"); and

WHEREAS, the City Council desires to approve the intergovernmental agreement for the Project; and

WHEREAS, the City Council hereby finds and determines that authorizing the City Manager to execute said intergovernmental agreement is in the best interest of the City of Lakewood.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Lakewood, Colorado, that:

SECTION 1. The intergovernmental agreement is hereby approved and the City Manager is hereby authorized to enter into, and the City Clerk to attest, the intergovernmental agreement on behalf of the City.

SECTION 2. This resolution shall become effective immediately upon its adoption.

INTRODUCED, READ AND ADOPTED by a vote of ____ for and ____ against at a regular meeting of the City Council on December 13, 2021, at 7 o'clock p.m. at Lakewood City Hall, 480 South Allison Parkway, Lakewood, Colorado.

Adam Paul, Mayor

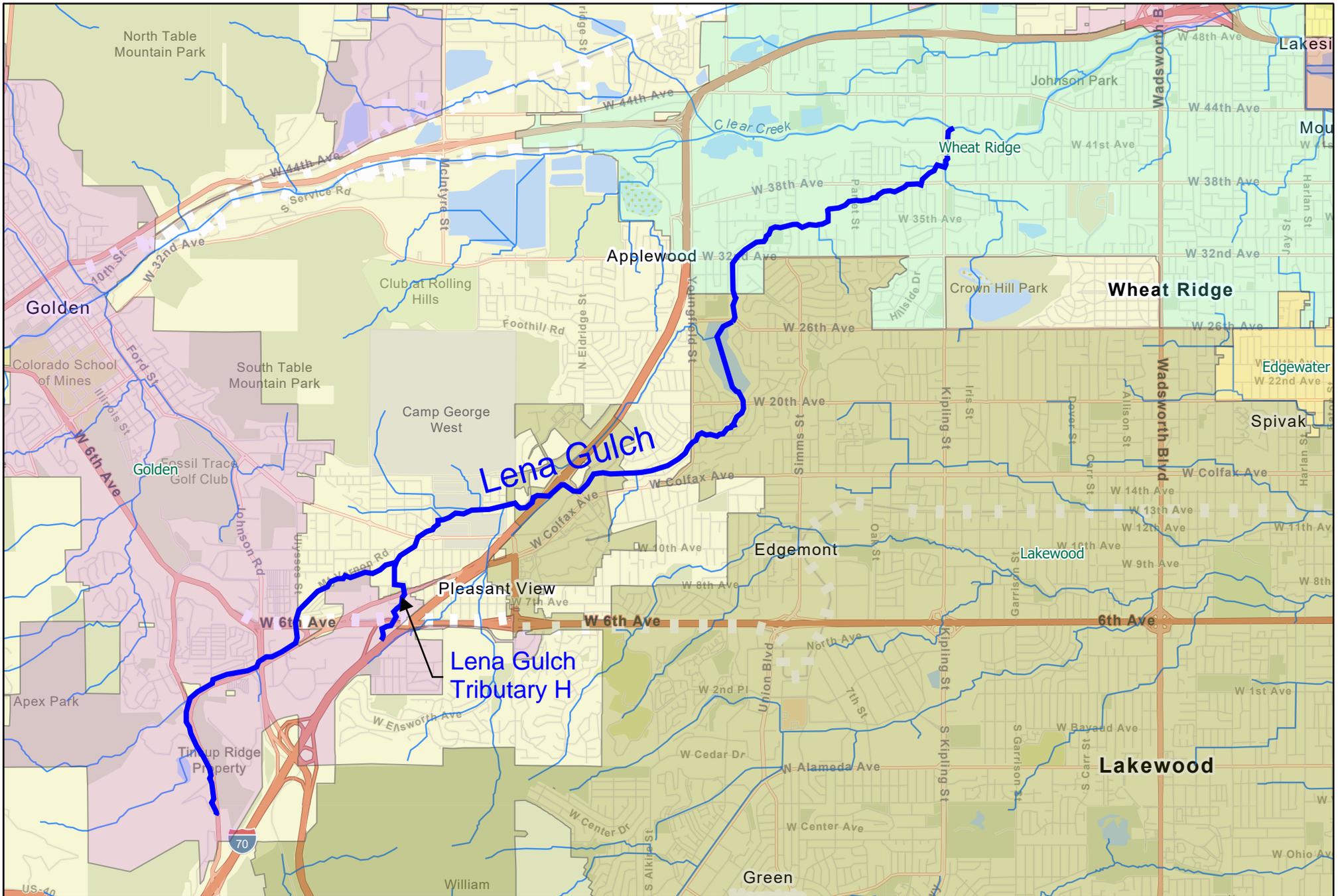
ATTEST:

Bruce Roome, City Clerk

APPROVED AS TO FORM:

Alison McKenney Brown, City Attorney

Lena Gulch and Tributary H



AGREEMENT REGARDING FUNDING OF
MAJOR DRAINAGEWAY PLANNING
AND FLOOD HAZARD AREA DELINEATION FOR
LENA GULCH AND TRIBUTARY H

Agreement No. 21-07.22
Project No. 107861
Agreement Amount \$260,000

THIS AGREEMENT, by and between URBAN DRAINAGE AND FLOOD CONTROL DISTRICT D/B/A MILE HIGH FLOOD DISTRICT (hereinafter called "DISTRICT"), CITY OF LAKEWOOD (hereinafter called "LAKEWOOD") and CITY OF WHEAT RIDGE (hereinafter called "WHEAT RIDGE"); (hereinafter LAKEWOOD and WHEAT RIDGE shall be collectively known as "PROJECT SPONSORS" and DISTRICT and PROJECT SPONSORS shall be collectively known as "PARTIES");

WITNESSETH THAT:

WHEREAS, DISTRICT in a policy statement previously adopted (Resolution No. 14, Series of 1970), expressed an intent to assist public bodies which have heretofore enacted floodplain zoning measures; and

WHEREAS, DISTRICT has previously established a Work Program for 2021 (Resolution No. 66, Series of 2020) which includes master planning; and

WHEREAS, PARTIES now desire to proceed with development of a drainageway master plan and a flood hazard area delineation (FHAD) report for Lena Gulch and Tributary H (hereinafter called "PROJECT"); and

WHEREAS, DISTRICT's Board of Directors has authorized DISTRICT financial participation for PROJECT (Resolution No. 86, Series of 2019); and

WHEREAS, PARTIES desire to acquire mapping needed to conduct the engineering studies for PROJECT; and

WHEREAS, PARTIES desire to engage an engineer to render certain technical and professional advice and to compile information, evaluate, study, and recommend design solutions to such drainage problems for PROJECT which are in the best interest of PARTIES.

NOW, THEREFORE, in consideration of the mutual promises contained herein, PARTIES hereto agree as follows:

1. SCOPE OF AGREEMENT

This Agreement defines the responsibilities and financial commitments of PARTIES with respect to PROJECT.

2. PROJECT AREA

DISTRICT shall engage an engineer and obtain mapping as needed to perform or supply necessary services in connection with and respecting the planning of PROJECT of the area and watershed shown on the attached Exhibit A (hereinafter called "AREA").

3. SCOPE OF PROJECT

The purpose of PROJECT is to develop a drainageway master plan and FHAD, including hydrologic information and the locations, alignments, and sizing of storm sewers, channels, detention/retention basins, and other facilities and appurtenances needed to provide efficient stormwater drainage within AREA. The proposed work shall include, but not be limited to, mapping; compilation of existing data; necessary field work; and development and consistent evaluation of all reasonable alternatives so that the most feasible drainage and flood control master plan can be determined and justified for AREA. Consideration shall be given to costs, existing and proposed land use, existing and proposed drainage systems, known drainage or flooding problems, known or anticipated erosion problems, stormwater quality, right-of-way needs, existing wetlands and riparian zones, open space and wildlife habitat benefits, and legal requirements. Schematic alternative plans shall be developed such that comparison with other alternatives can be made. Drainage system planning shall be done in four phases by the engineer engaged by DISTRICT, culminating in a drainage master plan report. During the first phase, the selected engineer shall perform all data gathering and modeling needed to prepare the baseline hydrology section of the master plan report containing an introduction, study area description, and hydrologic analysis description. During the second phase, the engineer shall perform all analysis needed to prepare and submit the FHAD report. During the third phase, the engineer shall perform all studies and data gathering needed to prepare the alternatives analysis sections of the master plan report containing a hydraulic analysis discussion, schematics of alternatives developed, and their costs along with a discussion of the pros and cons of each alternative and a recommended plan. A single alternative will be selected by PARTIES after the review and evaluation of the alternatives analysis report. During the fourth phase, the engineer shall be directed to prepare a conceptual design for the selected alternative and prepare the conceptual design section of the master plan report. DISTRICT, in coordination with PROJECT SPONSORS, will send notifications of change in flood risk potential to all property owners affected by the new floodplain delineation based on contact information provided by PROJECT SPONSORS.

4. PUBLIC NECESSITY

PARTIES agree that the work performed pursuant to this Agreement is necessary for the health, safety, comfort, convenience, and welfare of all the people of the State, and is of particular benefit to the inhabitants of PARTIES and to their property therein.

5. PROJECT COSTS

PARTIES agree that for the purposes of this Agreement PROJECT costs shall consist of, and be limited to, mapping, master planning, FHAD and related services and contingencies mutually agreeable to PARTIES. Project costs are estimated not to exceed \$260,000.

6. FINANCIAL COMMITMENTS OF PARTIES

PARTIES shall each contribute the following percentages and maximum amounts for PROJECT costs as defined in Paragraphs 5:

	Master Plan <u>Percentage Share</u>	Maximum <u>Contribution</u>	FHAD <u>Contribution</u>
DISTRICT	59.26%	\$80,000	\$125,000
LAKEWOOD	18.52%	\$25,000	-
<u>WHEAT RIDGE</u>	<u>22.22%</u>	<u>\$30,000</u>	<u>-</u>
TOTAL	100.00%	\$135,000	\$125,000

Past PROJECT SPONSORS, under separate Agreement Nos. 20-01.11 and 20-09.35, have contributed \$55,000 for PROJECT with 2020 funding. DISTRICT previously contributed \$20,000 to the Master Plan under Agreement 20-01.11 for PROJECT with 2020 funding.

Each PARTY'S payment obligation, whether direct or contingent, extends only to funds appropriated annually by each PARTY'S governing body, paid into the treasury of that PARTY, and encumbered for the purpose of this AGREEMENT. Each PARTY does not by this Agreement irrevocably pledge present cash reserves for payment or performance in future fiscal years. This Agreement does not and is not intended to create a multiple-fiscal year direct or indirect debt or financial obligation of each PARTY.

7. MANAGEMENT OF FINANCES

As set forth in DISTRICT policy (Resolution No. 11, Series of 1973, Resolution No. 49, Series of 1977, and Resolution No. 37, Series of 2009), the funding of a local body's one-half share may come from its own revenue sources or from funds received from state, federal or other sources of funding without limitation and without prior DISTRICT approval.

Payment by DISTRICT of \$40,000 has already been made. Payment of each party's full share (LAKEWOOD - \$25,000; WHEAT RIDGE - \$30,000 DISTRICT - \$205,000) shall be made to DISTRICT subsequent to execution of this Agreement and within 30 days of request for payment by DISTRICT. The payments by PARTIES shall be held by DISTRICT in a special fund to pay for increments of PROJECT as authorized by PARTIES, and as defined herein. DISTRICT shall provide a periodic accounting of PROJECT funds as well as a periodic notification to PROJECT SPONSORS of any unpaid obligations. Any interest earned by the monies contributed by PARTIES shall be accrued to the special fund established by DISTRICT for PROJECT and such interest shall be used only for PROJECT upon approval by the contracting officers (Paragraph 13). Within one year of completion of PROJECT if there are monies including interest earned remaining which are not committed, obligated, or disbursed, each party shall receive a share of such monies, which shares shall be computed as were the original shares; or, at PROJECT SPONSORS request, PROJECT SPONSORS share of remaining monies shall be transferred to another special fund held by DISTRICT.

8. PROJECT MAPPING

No new mapping is anticipated under this Agreement for PROJECT. Upon execution of this Agreement, PROJECT SPONSORS shall provide copies of the most recent mapping within their

jurisdictional area in digital format to DISTRICT to the extent such mapping is available without additional cost.

9. MASTER PLANNING AND FHAD

Upon execution of this Agreement, PARTIES shall select an engineer mutually agreeable to PARTIES. DISTRICT, with the approval of PROJECT SPONSORS, shall contract with the selected engineer, shall administer the contract, and shall supervise and coordinate the planning for the development of alternatives and of conceptual design.

10. PUBLISHED REPORTS AND PROJECT DATA

DISTRICT will provide to each of PROJECT SPONSORS access to the draft and final electronic report files.

Upon completion of PROJECT, electronic files of all mapping, drawings, and hydrologic and hydraulic calculations developed by the engineer contracted for PROJECT shall be provided to any PROJECT SPONSORS requesting such data.

11. TERM OF THE AGREEMENT

The term of this Agreement shall commence upon execution by all PARTIES and shall terminate two years after the final master planning report is delivered to DISTRICT and the final accounting of funds on deposit at DISTRICT is provided to all PARTIES pursuant to Paragraph 7 herein.

12. LIABILITY

Each party hereto shall be responsible for any suits, demands, costs or actions at law resulting from its own acts or omissions and may insure against such possibilities as appropriate.

13. CONTRACTING OFFICERS

- A. The contracting officer for LAKEWOOD shall be the City Manager, 480 South Allison Parkway, Lakewood, Colorado 80226.
- B. The contracting officer for WHEAT RIDGE shall be the Director of Public Works, 7500 West 29th Avenue, Wheat Ridge, Colorado 80033.
- C. The contracting officer for DISTRICT shall be the Executive Director, 2480 West 26th Avenue, Suite 156B, Denver, Colorado 80211.
- D. The contracting officers for PARTIES each agree to designate and assign a PROJECT representative to act on the behalf of said PARTIES in all matters related to PROJECT undertaken pursuant to this Agreement. Each representative shall coordinate all PROJECT-related issues between PARTIES, shall attend all progress meetings, and shall be responsible for providing all available PROJECT-related file information to the engineer upon request by DISTRICT or PROJECT SPONSOR. Said representatives shall have the authority for all approvals, authorizations, notices, or concurrences required under this Agreement. However, in regard to any amendments or addenda to this Agreement, said representative shall be responsible to promptly obtain the approval of the proper authority.

14. RESPONSIBILITIES OF PARTIES

DISTRICT shall be responsible for coordinating with PROJECT SPONSORS the information developed by the various consultants hired by DISTRICT and for obtaining all concurrences from PROJECT SPONSORS needed to complete PROJECT in a timely manner. PROJECT SPONSORS agree to review all draft reports and to provide comments within 21 calendar days after the draft reports have been provided by DISTRICT to PROJECT SPONSORS. PROJECT SPONSORS also agree to evaluate the alternatives presented in the alternatives analysis sections of the report, to select an alternative, and to notify DISTRICT of their decision(s) within 30 calendar days after the alternatives analysis report is provided to PROJECT SPONSORS by DISTRICT.

15. AMENDMENTS

This Agreement contains all of the terms agreed upon by and among PARTIES. Any amendments to this Agreement shall be in writing and executed by PARTIES hereto to be valid and binding.

16. SEVERABILITY

If any clause or provision herein contained shall be adjudged to be invalid or unenforceable by a court of competent jurisdiction or by operation of any applicable law, such invalid or unenforceable clause or provision shall not affect the validity of the Agreement as a whole and all other clauses or provisions shall be given full force and effect.

17. APPLICABLE LAWS

This Agreement shall be governed by and construed in accordance with the laws of the State of Colorado. Jurisdiction for any and all legal actions regarding this Agreement shall be in the State of Colorado and venue for the same shall lie in the County where the Project is located.

18. ASSIGNABILITY

No party to this Agreement shall assign or transfer any of its rights or obligations hereunder without the prior written consent of the nonassigning party or parties to this Agreement.

19. BINDING EFFECT

The provisions of this Agreement shall bind and shall inure to the benefit of PARTIES hereto and to their respective successors and permitted assigns.

20. ENFORCEABILITY

PARTIES hereto agree and acknowledge that this Agreement may be enforced in law or in equity, by decree of specific performance or damages, or such other legal or equitable relief as may be available subject to the provisions of the laws of the State of Colorado.

21. TERMINATION OF AGREEMENT

This Agreement may be terminated upon thirty (30) days' written notice by any party to this Agreement, but only if there are no contingent, outstanding contracts. If there are contingent, outstanding contracts, this Agreement may only be terminated upon the cancellation of all contingent, outstanding contracts. All costs associated with the cancellation of the contingent contracts shall be shared between PARTIES in the same ratio(s) as were their contributions.

22. PUBLIC RELATIONS

It shall be at PROJECT SPONSOR's sole discretion to initiate and to carry out any public relations program to inform the residents in PROJECT area as to the purpose of PROJECT and what impact it may have on them. Technical information shall be presented to the public by the selected engineer. In any event DISTRICT shall have no responsibility for a public relations program, but shall assist PROJECT SPONSOR as needed and appropriate.

23. GOVERNMENTAL IMMUNITIES

The PARTIES hereto intend that nothing herein shall be deemed or construed as a waiver by any PARTY of any rights, limitations, or protections afforded to them under the Colorado Governmental Immunity Act (§ 24-10-101, *et seq.*, C.R.S.) as now or hereafter amended or otherwise available at law or equity.

24. NO DISCRIMINATION IN EMPLOYMENT

In connection with the performance of work under this Agreement, PARTIES agree not to refuse to hire, discharge, promote or demote, or to discriminate in matters of compensation against any person otherwise qualified on the basis of race, color, ancestry, creed, religion, national origin, gender, age, military status, sexual orientation, gender identity, marital status, or physical or mental disability and further agrees to insert the foregoing provision in all subcontracts hereunder.

25. APPROPRIATIONS

Notwithstanding any other term, condition, or provision herein, each and every obligation of PROJECT SPONSORS and/or DISTRICT stated in this Agreement is subject to the requirement of a prior appropriation of funds therefore by the appropriate governing body of each PROJECT SPONSOR and/or DISTRICT.

26. NO THIRD PARTY BENEFICIARIES

It is expressly understood and agreed that enforcement of the terms and conditions of this Agreement, and all rights of action relating to such enforcement, shall be strictly reserved to PARTIES, and nothing contained in this Agreement shall give or allow any such claim or right of action by any other or third person on such Agreement. It is the express intention of PARTIES that any person or party other than any one of PROJECT SPONSORS or DISTRICT receiving services or benefits under this Agreement shall be deemed to be an incidental beneficiary only.

27. WORKER WITHOUT AUTHORIZATION

PARTIES agree that any public contract for services executed as a result of this intergovernmental agreement shall prohibit the employment of workers without authorization in compliance with §8-17.5-101 C.R.S. *et seq.* The following language shall be included in any contract for public services:

- A. At the time of execution of this Agreement, CONTRACTOR does not knowingly employ or contract with a worker without authorization who will perform work under this Agreement.

- B. CONTRACTOR shall participate in the E-Verify Program, as defined in § 8 17.5-101(3.7), C.R.S., to confirm the employment eligibility of all employees who are newly hired for employment to perform work under this Agreement.
- C. CONTRACTOR shall not knowingly employ or contract with a worker without authorization to perform work under this Agreement.
- D. CONTRACTOR shall not enter into a contract with a subconsultant or subcontractor that fails to certify to CONTRACTOR that it shall not knowingly employ or contract with a worker without authorization to perform work under this Agreement.
- E. CONTRACTOR shall confirm the employment eligibility of all employees who are newly hired for employment to perform work under this Agreement through participation in the E-Verify Program.
- F. CONTRACTOR is prohibited from using the E-Verify Program procedures to undertake pre-employment screening of job applicants while performing its obligation under this Agreement, and that otherwise requires CONTRACTOR to comply with any and all federal requirements related to use of the E-Verify Program including, by way of example, all program requirements related to employee notification and preservation of employee rights.
- G. If CONTRACTOR obtains actual knowledge that a subconsultant or subcontractor performing work under this Agreement knowingly employs or contract with a worker without authorization, it will notify such subconsultant or subcontractor and PARTIES within three (3) days. CONTRACTOR shall also then terminate such subconsultant or subcontractor if within three (3) days after such notice the subconsultant or subcontractor does not stop employing or contracting with the illegal alien, unless during such three (3) day period the subconsultant or subcontractor provides information to establish that the subconsultant or subcontractor has not knowingly employed or contracted with a worker without authorization.
- H. CONTRACTOR shall comply with any reasonable request made in the course of an investigation by the Colorado Department of Labor and Employment under authority of § 8-17.5-102(5), C.R.S.
- I. CONTRACTOR shall, within twenty days after hiring an employee who is newly hired for employment to perform work under this Agreement, affirms that it has examined the legal work status of such employees, retained file copies of the documents required by 8 U.S.C. Section 1324a, and not altered or falsified the identification documents for such employees. CONTRACTOR shall provide a written, notarized copy of the affirmation to PARTIES.

28. EXECUTION IN COUNTERPARTS – ELECTRONIC SIGNATURES

This Agreement, and all subsequent documents requiring the signatures of PARTIES to this Agreement, may be executed in two or more counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same instrument. PARTIES approve the use of electronic signatures for execution of this Agreement, and all subsequent documents requiring

the signatures of PARTIES to this Agreement. Only the following two forms of electronic signatures shall be permitted to bind PARTIES to this Agreement, and all subsequent documents requiring the signatures of PARTIES to this Agreement.

- A. Electronic or facsimile delivery of a fully executed copy of a signature page; or
 - B. The image of the signature of an authorized signer inserted onto PDF format documents.
- Documents requiring notarization may also be notarized by electronic signature, as provided above. All use of electronic signatures shall be governed by the Colorado Uniform Electronic Transactions Act, §§ 24-71.3-101-121, C.R.S.

WHEREFORE, PARTIES hereto have caused this instrument to be executed by properly authorized signatories as of the date and year written below.

URBAN DRAINAGE AND
FLOOD CONTROL DISTRICT D/B/A
MILE HIGH FLOOD DISTRICT

By _____

Name Ken A. MacKenzie

Title Executive Director

Date _____

Checked By

CITY OF WHEAT RIDGE

By _____

Name: Bud Starker

Title: Mayor

Date _____

(SEAL)

ATTEST:

Steve Kirkpatrick, City Clerk

APPROVED AS TO FORM:

Gerald Dahl, City Attorney

CITY OF LAKEWOOD

(SEAL)

By _____

Kathleen E. Hodgson, City Manager

ATTEST:

Date _____

Bruce Roome, City Clerk

APPROVED AS TO FORM:

Gregory D. Graham, Deputy City Attorney

RECOMMENDED FOR APPROVAL:

Jay N. Hutchison, Director of Public Works

Chris Proper, Project Engineer

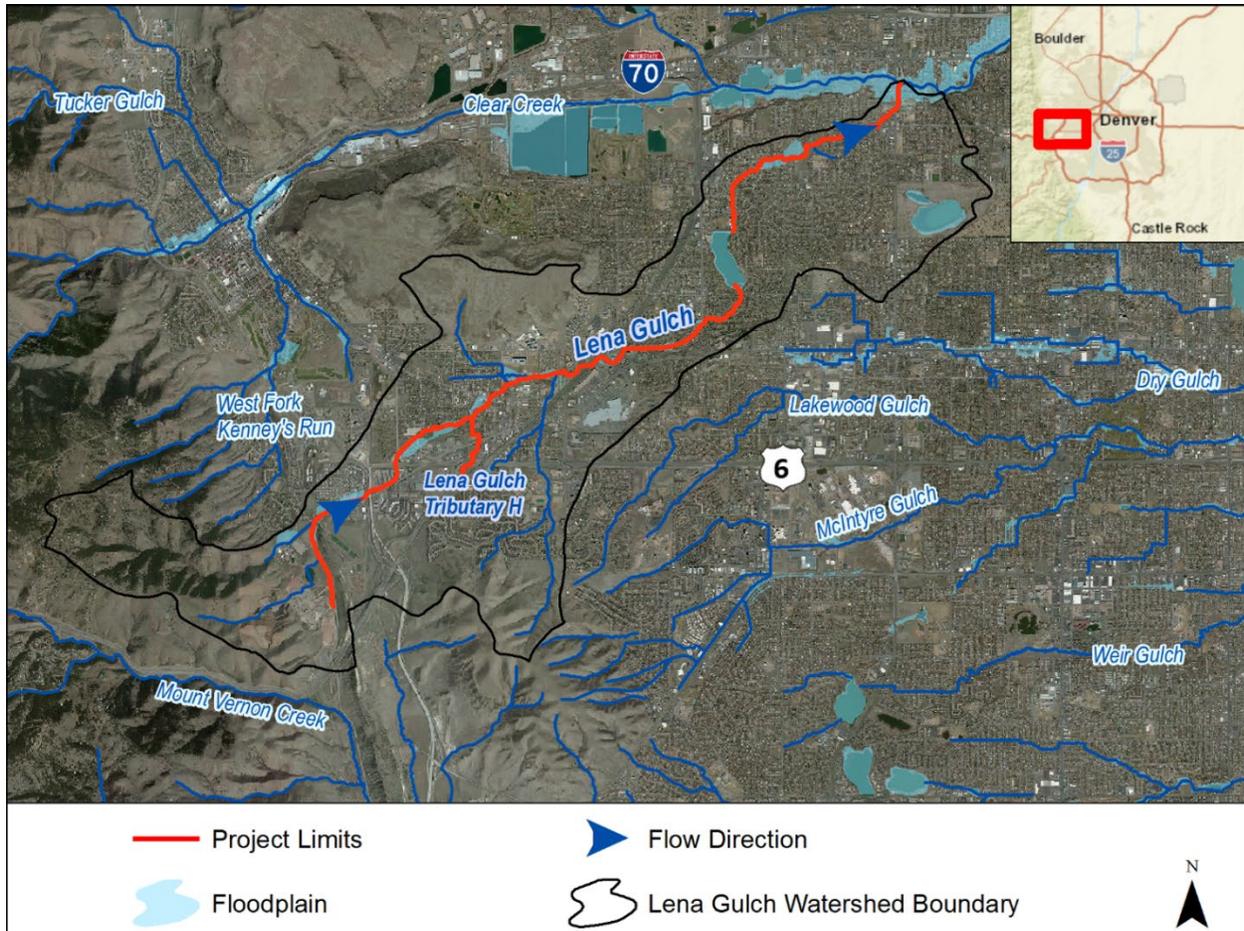
APPROVED AS TO FUNDING (if \$5,000 or greater):

Holly Björklund, Chief Financial Officer

AGREEMENT REGARDING FUNDING OF
MAJOR DRAINAGEWAY PLANNING
AND FLOOD HAZARD AREA DELINEATION FOR
LENA GULCH AND TRIBUTARY H

Agreement No. 21-07.22
Project No. 107861
Agreement Amount \$260,000

Exhibit A:



AGREEMENT REGARDING FUNDING OF
 MAJOR DRAINAGEWAY PLANNING
 AND FLOOD HAZARD AREA DELINEATION FOR
 LENA GULCH AND TRIBUTARY H

Agreement No. 21-07.22
 Project No. 107861
 Agreement Amount \$260,000

Exhibit B:

Sponsor	MDP		FHAD		IGA
	2020	2021	2020	2021	
Mile High Flood District	\$20,000	\$80,000	\$20,000	\$125,000	All
Golden	\$20,000				20-01.11
Jefferson County	\$35,000				20-09.35
Wheat Ridge		\$30,000			21-07.22
Lakewood		\$25,000			
Total	\$210,000		\$145,000		

STAFF MEMO

DATE OF COUNCIL MEETING: DECEMBER 13, 2021 / AGENDA ITEM NO. 10

To: Mayor and City Council

From: Kit Newland, Director Department of Community Resources, 303-987-7822

Subject: **A RESOLUTION AUTHORIZING THE PURCHASE OF REAL PROPERTY FROM THE DANIEL WILSON PORTER LIVING TRUST, FOR OPEN SPACE AND PARK PURPOSES, INCLUDING ACCEPTANCE OF A DEED THEREFOR, AND NAMING THE PROPERTY PORTER PARK**

SUMMARY STATEMENT: A resolution declaring the intent to purchase 7.77 acres of land at 731 Tabor Street for park purposes and naming the park

BACKGROUND INFORMATION: The City of Lakewood has been looking to acquire park properties in areas that are under served. Based on the Conservation Fund Gap Analysis completed in the spring of 2019, the Community Resources Department has been focusing particular attention on identifying parkland acquisition opportunities in northern areas of the city. The Porter Farm parcel is a rare large vacant property north of Sixth Avenue.

Department staff identified this property was for sale and have come to terms with the current owners.

To honor the legacy of the family, the owners have requested the property be named after their deceased parents, Daniel Wilson Porter and Phyllis Porter. A resident of Lakewood for over 70 years, Daniel Porter served on the boards of High View Water District and Golden Canal and Reservoir Company. He was a scoutmaster, election judge, and a Kiwanis member and church volunteer for most of his life. Phyllis was also dedicated to her community. She was an Alameda High School math teacher, a Scout Leader for 12 years, active member of League of Women Voters, election judge, census taker, and for many years a volunteer at the Denver Museum of Nature and Science. Daniel and Phyllis had a love for farming and preservation, Daniel became a Master Gardener late in life. The Porter family desires the city to carry-on the farming tradition on the property with a farming element to the future park that would serve the Lakewood community.

City guidelines concerning the naming or renaming of parks, recreation/cultural facilities, and major features state that when a park or facility is associated with or located near events, people, or places of historic, cultural, or social significance, consideration will be given to naming that park or facility after such events, people or places.

BUDGETARY IMPACTS: The City Council has appropriated \$8,500,000 for park acquisitions from the first installment of TABOR refund recaptures.

Plans for the use of the property may involve removal of structures and later, development of park improvements. There will be costs associated with the construction of improvements. The development of the site is initially funded in the five-year Capital Improvement Plan budget for 2023.

Ongoing maintenance will be comparable to other neighborhood parks.

STAFF RECOMMENDATIONS: The Department of Community Resources recommends the adoption of the attached resolution and approval for acquisition of this parcel of land for open space or park property. Additionally, staff recommends approval of Porter Park as the name of the park after the former owners, Daniel and Phyllis Porter, for their contributions to the community.

ALTERNATIVES: The alternative to this proposal would be to let the property be sold to a private entity. The property is currently zoned R-2, and could be developed into small lot residential or duplex uses under the current zoning.

PUBLIC OUTREACH: No public outreach has been conducted regarding the acquisition of property. Public engagement would commence following the acquisition to determine appropriate uses of the site.

NEXT STEPS: Upon adoption of the resolution, the City will proceed with the acquisition of the property and begin plans for development of park improvements. Should Council choose to approve the request to name the new park, Porter Park, it will become effective immediately. Community Resources staff will order new signage for the park and update the city website, maps and other park materials when appropriate.

ATTACHMENTS: Resolution 2021-52
Site map

REVIEWED BY: Kathleen E. Hodgson, City Manager
Benjamin B. Goldstein, Deputy City Manager
Allison McKenney Brown, City Attorney

A RESOLUTION

AUTHORIZING THE PURCHASE OF REAL PROPERTY FOR OPEN SPACE AND PARK PURPOSES FROM THE DANIEL WILSON PORTER LIVING TRUST, INCLUDING ACCEPTANCE OF A DEED THEREFOR, AND NAMING THE PROPERTY PORTER PARK

WHEREAS, the City of Lakewood (the "City") desires to purchase approximately 7.77 acres of land generally located in the southeast quarter of the southeast quarter of Section 5, Township 4 South, Range 69 West of the 6th P.M., County of Jefferson, State of Colorado, and as more particularly described in Exhibit "A" attached hereto (the "Property"), for the purpose of preserving the Property for open space and park purposes, along with the right to approximately five (5) inches of water in the Welch Ditch (the "Water Rights") for municipal purposes;

WHEREAS, the City will acquire the Property and Water Rights in accordance with the terms of a Purchase and Sale Agreement between the City and the Daniel Wilson Porter Living Trust (the "Purchase Agreement");

WHEREAS, the City has unallocated balances in the TABOR Fund for park and open space acquisition, and the City Council desires to authorize expenditures therefrom to purchase the Property and Water Rights;

WHEREAS, the purchase of the Property for park purposes aligns with one of the City's goals to purchase land for park property in underserved neighborhoods;

WHEREAS, the purchase price for the Property is not to exceed two million twenty thousand dollars (\$2,020,000) and the purchase of the Water Rights is not to exceed fifteen thousand dollars (\$15,000);

WHEREAS, City staff has performed a "due diligence" inspection of the Property that includes a title commitment, survey, and environmental reports, and the City Attorney's Office will review and approve the final Purchase Agreement as to form;

WHEREAS, Daniel Wilson Porter and Phyllis Porter were the owners of the Property for over 70 years and devoted community servants, who desired to preserve the property for park purposes;

WHEREAS, The Director of Community Resources finds Daniel Wilson Porter and Phyllis Porter were individuals of historic significance and their relationship to the city and the Property are clearly demonstrated;

WHEREAS, the City Council hereby finds and determines that authorizing the purchase of the Property and Water Rights using funds from the TABOR Fund and naming the Property Porter Park after its former owners, is and shall be, in the best interest of the residents of the City.

NOW, THEREFORE BE IT RESOLVED by the City Council of the City of Lakewood, Colorado, that:

SECTION 1. The City of Lakewood hereby declares its intent to purchase the Property in fee simple for open space and park purposes and Water Rights for municipal purposes.

SECTION 2. The purchase of the Property and Water Rights will serve public purposes and further the health and welfare of the residents of Lakewood.

SECTION 3. The Property will be named Porter Park after its former owners of historic significance.

SECTION 3. The City Manager or designee is hereby authorized to execute the Purchase Agreement and all other documents necessary to facilitate or complete the acquisition of the Property and Water Rights, following review and approval of all such documents by the City Attorney's Office.

SECTION 4. The City Council hereby authorizes the expenditure of up to two million twenty thousand dollars (\$2,020,000) from the TABOR Fund for fiscal year 2021 for the purchase of the Property and up to fifteen thousand dollars (\$15,000) for purchase of the Water Rights.

SECTION 5. The City's Chief Financial Officer is hereby authorized and directed to pay amounts not to exceed two million thirty-five thousand dollars (\$2,035,000) for the acquisition of the Property and Water Rights upon receipt of appropriate documentation.

SECTION 6. This Resolution shall become effective immediately upon adoption.

INTRODUCED, READ AND ADOPTED by a vote of __ for and __ against at a regular meeting of the City Council on December 13, 2021, at 7 o'clock p.m. at Lakewood Civic Center, South Building, 480 South Allison Parkway, Lakewood, Colorado.

Adam Paul, Mayor

ATTEST:

Bruce Roome, City Clerk

APPROVED AS TO FORM:

Alison McKenney Brown, City Attorney





**MINUTES
REGULAR MEETING OF CITY COUNCIL
CITY OF LAKEWOOD
7:00 PM
NOVEMBER 22, 2021**

Minutes are action minutes only with links on each item for easy reference to the meeting video.

ITEM 1 - CALL TO ORDER

[View video recording here](#)

Mayor Paul called the HYBRID MEETING to order at 7:00 p.m.

ITEM 2 - ROLL CALL

[View video recording here](#)

Those present were:

- Mayor Adam Paul, Presiding
- Charley Able
- Mike Bieda via Zoom
- Barb Franks via Zoom
- Karen Harrison
- Ramey Johnson
- Jacob LaBure
- David Skilling
- Anita Springsteen via Zoom
- Sharon Vincent

Absent: None.

Others in attendance:

- Kathy Hodgson, City Manager
- Ben Goldstein, Deputy City Manager
- Alison McKenney Brown, City Attorney
- Municipal Judge Anne Stavig
- Bruce Roome, City Clerk

Full and timely notice of this City Council meeting had been given, and a quorum was present.

ITEM 3 - PLEDGE OF ALLEGIANCE

[View video recording here](#)

The Pledge of Allegiance was recited, and there was a moment for silent reflection.

ITEM 4 – STATEMENT OF CONFLICT OF INTEREST

ITEM 5 – APPROVAL MINUTES OF CITY COUNCIL MEETINGS

[View video recording here](#)

Regular Meeting	October 25, 2021
Regular Meeting	October 11, 2021
Regular Meeting	September 27, 2021
Regular Meeting	September 13, 2021
Regular Meeting	December 14, 2020
Special Meeting	October 4, 2021
Special Meeting	September 27, 2021
Special Meeting	September 20, 2021

Mayor Pro Tem Skilling made a motion for approval of the City Council regular and special meeting minutes introduced into the record by the City Clerk. The motion was seconded.

Vote on Consent Agenda:

AYE: Paul, Able, Franks, Harrison, LaBure, Skilling, Vincent

NAY: Bieda, Johnson, Springsteen

Result

Approved 7 - 3, the motion passed.

ITEM 6 – PUBLIC COMMENT

[View video recording here](#)

In chambers:

1. Congressman Ed Perlmutter, thanked the Council members that were leaving tonight for their service and welcomed the new council members.
2. Walt Johnson, 675 Estes St, stated what a great job his wife Councilor Ramey Johnson has done as well as the other members who were leaving tonight.
3. Natalie Menton, Ward 5, thanked Councilors for their service. She wanted to know why there were so many minutes being approved tonight.

Via telephone:

1. Joshua Comden, Ward 1, thanked the Mayor for their meeting last week. Spoke about the citizen review board.

ITEM 7 – INDUCTION CEREMONY

[View video recording here](#)

Council members Bieda, Johnson, LaBure, Harrison, Skilling each spoke briefly about their time on the Lakewood City Council.

City Manager Kathy Hodgson thanked the outgoing City Council members, including highlights of their work while on Council. Ms. Hodgson presented each Council member a street sign

City Clerk Bruce Roome swore in Presiding Municipal Judge Anne Stavig
Judge Stavig swore in Municipal Judge Nicole Bozarth
Judge Stavig swore in Jeslin Shahrezaei, Ward 1 Council member
Judge Stavig swore in Sophia. Mayott-Guerrero, Ward 2 Council member
Judge Stavig swore in Rebekah. Stewart, Ward 3 Council member
Judge Stavig swore in Richard Olver, Ward 4 Council member
Judge Stavig swore in Wendi Strom, Ward 5 Council member

ITEM 8 – RECESS – RECEPTION FOR INCOMING/OUTGOING CITY COUNCIL MEMBERS

[View video recording here](#)

Mayor Paul recessed the meeting at 7:53 pm for a 20-minute reception in the atrium.

Mayor Paul called the meeting back to order at 8:32 pm and asked the City Clerk to take roll of the newly seated City Council.

[View Video recording here](#)

Those present were:

- Mayor Adam Paul, Presiding
- Charley Able
- Barb Franks via Zoom
- Sophia Mayott-Guerrero
- Rich Olver
- Jeslin Shahrezaei
- Anita Springsteen via Zoom
- Rebekah Stewart
- Wendi Strom
- Sharon Vincent

Absent: None.

ITEM 9 – GENERAL BUSINESS

[View video recording here](#)

City Manager welcomed the new council members and gave an update on upcoming council regular meetings, study sessions and topics. Ms. Hodgson stated that all study sessions will remain completely virtual through Zoom.

ITEM 10 – MAYOR AND CITY COUNCIL REPORTS

[View video recording here](#)

Mayor Paul and City Council Members reported on news from their Wards and any other City business with which they were involved.

ITEM 11 – ADJOURNMENT

[View video recording here](#)

There being no further business to come before City Council, Mayor Paul adjourned the meeting at 8:57 p.m.

Respectfully submitted,

Bruce Roome, City Clerk



Lakewood

Advisory Commission

EXECUTIVE COMMITTEE MEETING LAKEWOOD ADVISORY COMMISSION

July 7, 2021 @ 6:00 PM

MINUTES

Call to Order

Chair Peggy Ralph called the virtual meeting to order at 6:00 p.m.

Roll Call

Commissioners Present: Ralph, Hensley, Malandri, McBride, Cornell, Gelfuso-Goetz

Absent: None

Guest: Gordey

Staff Present: Bruce Roome, City Clerk; Rosa Tate, Boards & Commissions Coordinator

A total of 6 commissioners were present. A quorum was present.

3. Public Comment

Comments received via telephone:

None

Comments received via Lakewood Speaks:

None

4. Approval of Minutes

Voting

Commissioner Hensley moved to approve the June 3, 2021, Executive Committee Meeting Minutes. The motion was seconded.

AYE: Commissioners McBride, Gelfuso-Goetz, Malandri, Hensley, Cornell, Chair Ralph

NAY: None

Result

Approved 6 - 0, the motion passed.

5. Old Business

5a. Sustainability Committee Proposals:

Commissioner Gelfuso-Goetz spoke on the proposal for helping people to make their own Lakewood Garden and proposal on how to help the city promote what the city is already doing. She also mentioned the Anti-idling proposal which was reported months ago.

5b. Civic Awareness Proposals:

Illegal Use of Fireworks proposal waiting to go before Council.

5c. Looking at Lakewood articles about LAC:

Chair Ralph's article was in the June 7th publication.

6. New Business

Chair Ralph introduced a resolution:

“Whereas the City Clerk and the City Attorney brought to light problems with the LAC policy and procedures. The LAC Executive committee finds it necessary to form an adhoc committee to review and make changes to the current policy and procedures. This committee will research and update the policy and procedures and bring them to the full committee for discussion. Once they are agreed upon the full commission will vote to approve the new updated policy and procedures.”

Commissioner Hensley motioned to adopt the resolution for an adhoc committee to work on policy and procedures for the LAC pending typographical corrections. The motion was seconded.

AYE: Commissioners McBride, Gelfuso-Goetz, Malandri, Hensley, Cornell, Chair Ralph

NAY: None

Result

Approved 6 – 0, the motion passed.

7. Topics for Discussion

7a. Chair Ralph discussed determining if the LAC should continue or if there should be separate committees created to fit more of what works for city staff.

7b. Gelfuso-Goetz stated being broader having up to four committees that are not strict to what the committees are titled and possibly revisiting the purpose and title every three years.

7c. Chair Ralph spoke on Diversity Committee mission statement. Does it need to go to council for approval?

7d. Malandri stated that the fireworks proposal is a prime example of city council members really wanting to hear proposals from the LAC.

7e. Gelfuso-Goetz would like clarification on what the city wants to do with the LAC as they are not using the LAC for its intended purpose. If city council does not need the LAC, is there a way to help the citizens outside of city council so that LAC can be more affective moving forward based on the needs of the city.

7f. Chair Ralph stated out of the last ten presentations, nine were presented by LAC. As the largest committee in the city of Lakewood, see what we are doing for our city. Senior citizens in the city need help with living expenses which does not fall under any of the LACs sub-committees.

8. City Clerk's Report

8a. City Clerk Roome confirmed that the Ordinance O-2021-20, Permanent establishment of a fourth committee to the LAC will go into effect August 26, 2021. Once the ordinance goes into effect, the LAC can implement the mission statement. This does not need to be added into the ordinance.

8b. City Clerk Roome stated that the committees will be specific in the ordinance for the purpose of focusing on the four specific areas within the city.

8c. City Clerk Roome to meet with Kathy Hodgson on July 20th to discuss what direction the city wants the LAC to go. One suggestion is making the committees stand alone to partner with specific areas with the city staff.

9. Adjourn

There being no further business to come before the Executive Committee, Chair Peggy Ralph adjourned the meeting at 6:53 p.m.

Respectfully submitted,

Jamie Cornell

Jamie Cornell, Secretary



Lakewood

Advisory Commission

**EXECUTIVE COMMITTEE MEETING
LAKEWOOD ADVISORY COMMISSION
SEPTEMBER 1, 2021 @ 6:00 PM
MINUTES**

Call to Order

Chair Peggy Ralph called the virtual meeting to order at 6:04 p.m.

Roll Call

Commissioners Present: Cornell, Gordey, Malandri, McBride and Ralph

Commissioners Absent: Gelfuso-Goetz and Hensley

Staff Present: Bruce Roome, City Clerk; Rosa Tate, Boards & Commissions Coordinator

A total of 5 commissioners were present. A quorum was present.

3. Public Comment

Comments received via telephone:

None

Comments received via Lakewood Speaks:

None

4. Approval of Minutes

Voting

Commissioner Malandri moved to approve the July 7, 2021, Executive Committee Meeting Minutes. The motion was seconded.

AYE: Commissioners Cornell, Gordey, Malandri, McBride and Chair Ralph

NAY: None

Result

Approved 5 - 0, the motion passed.

5. Old Business

5a. Sustainability Committee Proposals:

City Clerk Bruce Roome - Anti-idling proposal is on the schedule for October 18th.

5b. Civic Awareness Proposals:

City Clerk Bruce Roome - Illegal Use of Fireworks proposal, he spoke with the mayor and the mayor would like to wait until the new council members are in place.

5c. Neighborhoods: Commissioner McBride updated that the committee has been working with two city staff from public works on a public facing map where the community can update information such as missing sidewalks or inadequate sidewalks by placing their cursor on the map and if the information isn't already there, they can put it on the map.

5d. Ad Hoc Policy and Procedures:

Ad Hoc committee is working on the By-Laws, Policies and Procedures. The committee will update at next meeting in October.

6. New Business

LAC Diversity Committee is now official. Diversity Committee meetings will be held on the third Thursday at 6:30pm moving the Full Commission to 7:30pm and the other committees will remain at their normal scheduled times.

Screening Committee convened on Tuesday, August 31st at 5:30pm. They interviewed a total of six candidates. Three were appointed to the LAC and one was appointed to the HPC. They will be appointed by council on Monday, September 27 at the regular meeting.

7. Topics for Discussion

7a. Chair Ralph mentioned having guest speakers come to the meetings.

Commissioner Malandri spoke about city staff from different departments coming to update the LAC on their area of expertise. City Clerk, Bruce Roome noted that the City Manager does not want staff speaking as their workloads are at max capacity.

7b. Chair Ralph will check with the Lakewood Historical Society about possibly coming and speaking.

7c. Commissioner Malandri asked if the shopping bag issue has been assigned to a committee. City Clerk, Bruce Roome sent an email to city staff to get an update but has not heard anything back to date. The shopping bag issue has been assigned to Sustainability.

8. City Clerk's Report

8a. City Clerk spoke that once the new members are officially sworn in, they will need to attend the new member orientation which will be done via Zoom by the City Clerk's Office. Boards and Commissions coordinator, Rosa Tate will submit a few dates to have the orientation based on all schedules.

8b. City Clerk clarified that public made videos cannot be posted on any city websites. Video donated by Commissioner Freeman has been uploaded to the google doc's page.

8c. Chair Ralph would like to talk about new projects and ideas in October and November.

9. Adjourn

There being no further business to come before the Executive Committee, Chair Peggy Ralph adjourned the meeting at 6:37 p.m.

Respectfully submitted,

Jamie Cornell

Jamie Cornell, Secretary



STAFF MEMO

DATE OF COUNCIL MEETING: DECEMBER 13, 2021 / AGENDA ITEM NO. 13

To: Mayor and City Council

From: Alison McKenney Brown, City Attorney, 303-987-7461

Subject: **RESOLUTION APPROVING LAKEWOOD'S PARTICIPATION IN THE COLORADO OPIOIDS SETTLEMENT MEMORANDUM OF UNDERSTANDING ("MOU") REGARDING THE SETTLEMENT OF CLAIMS AGAINST THE "BIG 3" OPIOID DISTRIBUTORS (MCKESSON, CARDINAL HEALTH, AND AMERISOURCEBERGEN) AND OPIOID MANUFACTURER JOHNSON & JOHNSON**

SUMMARY STATEMENT: This Resolution seeks to have Lakewood join in the Colorado Opioids Settlement Memorandum of Understanding ("MOU") and release all claims against the "Big 3" Opioid Distributors (McKesson, Cardinal Health, and AmerisourceBergen) and Opioid Manufacturer Johnson & Johnson.

BACKGROUND INFORMATION: There has been extensive litigation against both opioid manufacturers and opioid distributors over their roles in contributing to the nationwide opioid epidemic. Many local governments throughout the country, including Lakewood, have retained counsel, investigated claims, or initiated suit against opiate manufacturers and distributors. In June of 2018, Lakewood signed a contract for legal services with the law firms of Motley Rice LLC, and Speights, Worrich, Newcomb, Roth & Mitchell LLC to investigate, litigate, or negotiate for settlement any actionable claims against individuals and entities related to the marketing, prescribing, distribution, or sale of opioids. It should be noted that Motley Rice LLC withdrew as counsel of record for Lakewood on October 6, 2021, and that Lakewood owes no further obligation to the firm.

Nationwide settlements have been reached with the "Big 3" opioid distributors and with manufacturer Johnson & Johnson. These settlements are not exclusive to the State of Colorado and have impacted other states and local governments both within and outside of Colorado. Under the terms of the national settlements, the opioid distributors and manufacturer will pay up to \$22.8 billion in settlement proceeds to state and local subdivisions nationwide over two periods of time. For funds coming from the Johnson & Johnson settlement, the payments will be made over nine years, and for the funds coming from the "Big 3" settlement the payments will be made over eighteen years. Each state receives a percentage of this total recovery amount, and Colorado's maximum share is anticipated to exceed \$300 million.

The MOU to be adopted by Lakewood pursuant to this Resolution was created in response to the nationwide settlement discussed above and is intended to ensure strong participation from local governments within Colorado through incentive payments that can be reached based on the percentage of local governments that sign on to it. The MOU also delineates how the settlement proceeds will be distributed throughout the state: 10% directly to the state, 20% directly to participating local governments such as Lakewood, 60% directly to regions (regions are groups of counties, and Lakewood falls in the region shared by Jefferson, Gilpin, and Clear Creek Counties), and 10% to specific statewide abatement infrastructure projects. There are limits upon how local governments can spend these settlement dollars to ensure expenditures go toward opioid abatement strategies. Additionally, the MOU also calls for the creation of a General Abatement Fund Council, an expenditure oversight committee comprised of thirteen members. Lakewood and all other local governments will need to provide expenditure data to the General Abatement Fund Council on an annual basis.

The MOU also recognizes the contributions of litigating entities, such as Lakewood, to the nationwide settlements, and as such, it accounts for payment of the attorneys' fees for these litigating entities. This is of significant import to Lakewood because Speights, Worrich, Newcomb, Roth, & Mitchell would be fully compensated for all legal services rendered on behalf of the City. If Lakewood were to elect not to join the MOU and instead continued to litigate on its own, the firm's attorneys' fees would be deducted from any future settlement whereas the MOU equitably allocates the cost of attorneys' fees across all local governments, including nonlitigating entities.

To join the MOU, Lakewood must sign three forms, and has the option to sign a fourth.

- First, the Memorandum of Understanding (MOU);
- Second, the Subdivision Settlement Participation Form for the "Big 3" Distributor settlement;
- Third, the Subdivision Settlement Participation Form for the Johnson & Johnson settlement;
- And, finally, Fourth, Lakewood may also agree to participate in the Colorado Subdivision Escrow Agreement, which ensures that Lakewood's legal claims are released only when 95% participation by certain local governments has been reached, which is the threshold that secures a significant portion of the incentive payments under the terms of the MOU.

BUDGETARY IMPACTS: Under these agreements Lakewood anticipates receiving funds over the next 18 years, with an estimated total of \$1,005,868.26. Lakewood will also benefit from an even larger pool of funds that comes to the region shared by Jefferson, Gilpin, and Clear Creek Counties. The total estimated amount to be received by the Region over the next 18 years is \$23,134,200.00. These amounts are, however, only estimates as the total settlement amount under the MOU cannot be determined until the percentage of local governments that choose to join the MOU are finally determined.

STAFF RECOMMENDATIONS: Staff recommends signing the MOU, both Subdivision Settlement Participation Forms and the Colorado Subdivision Escrow Agreement.

ALTERNATIVES: Lakewood could continue to litigate this matter on its own, and attempt to garner a more favorable outcome.

PUBLIC OUTREACH: None at this time.

NEXT STEPS: To join in the State of Colorado opioid settlement the City Council must approve the three mandatory documents and submit signed documents to the State no later than December 29, 2021.

ATTACHMENTS: Resolution 2021-53
Colorado Opioids Settlement Memorandum of Understanding
Colorado Opioids Settlement Memorandum of Understanding Summary
Johnson & Johnson-Janssen Opioid Settlement Participation Form
Distributor Opioid Settlement Participation Form
Local Government Opioid Escrow Agreement

REVIEWED BY: Kathleen E. Hodgson, City Manager
Benjamin B. Goldstein, Deputy City Manager
Alison McKenney Brown, City Attorney

A RESOLUTION

APPROVING LAKEWOOD'S PARTICIPATION IN THE COLORADO OPIOIDS SETTLEMENT MEMORANDUM OF UNDERSTANDING ("MOU") REGARDING THE SETTLEMENT OF CLAIMS AGAINST THE "BIG 3" OPIOID DISTRIBUTORS (MCKESSON, CARDINAL HEALTH, AND AMERISOURCEBERGEN) AND OPIOID MANUFACTURER JOHNSON & JOHNSON

WHEREAS, the Lakewood City Council recognizes the harms caused to its residents by the opioid epidemic, the need to hold responsible those entities that created said harm, and the need to fund various programs to mitigate the harm caused;

WHEREAS, Lakewood previously signed a contract for legal services with the law firms of Motley Rice LLC, and Speights, Worrich, Newcomb, Roth & Mitchell LLC to investigate, litigate, or negotiate for settlement, actionable claims against individuals and entities related to the marketing, prescribing, distribution, or sale of opioids;

WHEREAS, national settlements have been reached with the "Big 3" opioid distributors and opioid manufacturer Johnson & Johnson to resolve claims by state and local governments that these companies contributed to the opioid epidemic;

WHEREAS, various government officials from across Colorado were independently involved in the negotiation for settlement against entities related to the marketing, prescribing, distribution or sale of opioids;

WHEREAS, these various government officials from across Colorado negotiated the Colorado Opioids Settlement Memorandum of Understanding ("MOU") to establish the framework for distributing and sharing opioid settlement proceeds throughout Colorado;

WHEREAS, the MOU was designed to encourage widespread local government agreement to its terms by creating incentives in the form of increased settlement funds based upon strong local government participation;

WHEREAS, Colorado's maximum share of the opioid settlement funds is estimated to be more than \$300 million;

WHEREAS, under the terms of the MOU, the settlement proceeds will be distributed as: 10% directly to the State; 20% directly to Participating Local Governments; 60% directly to regions; and 10% to specific state abatement infrastructure projects;

WHEREAS, to join in the MOU, Lakewood must first sign the MOU, and then must sign the Sign the Subdivision Settlement Participation Form for each of the two settlements (the "Big 3" Distributor settlement and the Johnson & Johnson settlement), agreeing to permanently release all claims against the "Big 3" Distributors and Johnson & Johnson;

WHEREAS, Lakewood may also sign the Colorado Subdivision Escrow Agreement, which ensures that Lakewood's legal claims are released only when 95% participation by certain local governments has been reached, which is the threshold that secures a significant portion of the incentive payments under the terms of the MOU;

WHEREAS, the City's Mayor or designee, as the City's official representative, is authorized to sign the MOU, the Subdivision Settlement Participation Forms, and the Colorado Subdivision Escrow Agreement; and

WHEREAS, the City Council hereby finds it to be in the best interest of the residents of the City of Lakewood to endorse the MOU, the Subdivision Settlement Participation Forms, and the Colorado Subdivision Escrow Agreement.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Lakewood:

The Mayor is hereby authorized to sign the MOU, the Subdivision Settlement Participation Forms, and the Colorado Subdivision Escrow Agreement.

The City Attorney and City Clerk are hereby authorized to submit each signed document to the Colorado Municipal League at 144 N. Sherman St. Denver, CO 80203, on or before, December 29, 2021.

INTRODUCED, READ AND ADOPTED by a vote of __ for and __ against at a regular meeting of the City Council on December 13, 2021, at 7 o'clock p.m. at Lakewood Civic Center, South Building, 480 South Allison Parkway, Lakewood, Colorado.

Adam Paul, Mayor

ATTEST:

Bruce Roome, City Clerk

APPROVED AS TO FORM:

Alison McKenney Brown, City Attorney

**COLORADO OPIOIDS SETTLEMENT MEMORANDUM OF UNDERSTANDING
("MOU")**

Thursday, August 26, 2021

August 25, 2021 Attorney General version

A. Definitions

As used in this MOU:

1. "Approved Purpose(s)" shall mean forward-looking strategies, programming, and services to abate the opioid epidemic as identified by the terms of any Settlement. If a Settlement is silent on Approved Purpose(s), then Approved Purpose(s) shall mean those forward-looking strategies to abate the opioid epidemic identified in **Exhibit A** or any supplemental forward-looking abatement strategies added to **Exhibit A** by the Abatement Council. Consistent with the terms of any Settlement, "Approved Purposes" shall also include the reasonable administrative costs associated with overseeing and administering Opioid Funds from each of the four (4) Shares described in Section (B)(2). Reimbursement by the State or Local Governments for past expenses are not Approved Purpose(s). "Approved Purposes" shall include attorneys' fees and expenses incurred in the course of the opioid litigation that are paid through the process discussed below.
2. "County Area" shall mean a county in the State of Colorado plus the Local Governments, or portion of any Local Government, within that county.
3. "Effective Date" shall mean the date on which a court of competent jurisdiction, including any bankruptcy court, enters the first Settlement by order or consent decree. The Parties anticipate that more than one Settlement will be administered according to the terms of this MOU, but that the first entered Settlement will trigger the formation of the Abatement Council in Section (C) and the Regional Councils in Section (F)(5).¹
4. "General Abatement Fund Council," or "Abatement Council," shall have the meaning described in Section (C), below.

¹ For the avoidance of doubt, the McKinsey Settlement and any other Settlement that precedes the finalization of drafting this MOU are not considered a trigger for purposes of the calculation of "Effective Date."

5. “Local Government(s)” shall mean all counties in the State of Colorado and the municipalities, towns, and county and city municipal corporations that are listed in **Exhibit B**.
6. “National Opioid Settlement Administrative Fund” shall mean any fund identified by a Settlement for the national distribution of Opioid Funds.
7. “Opioid Funds” shall mean damage awards obtained through a Settlement.
8. “Opioid Settling Defendant” shall mean any person or entity, or its affiliates, that engages in or has engaged in the manufacture, marketing, promotion, distribution, or dispensing of licit opioids.
9. “Participating Local Government(s)” shall mean all Local Governments that sign this MOU, and if required under terms of a particular Settlement, who have executed a release of claims with the Opioid Settlement Defendant(s). For the avoidance of doubt, a Local Government must sign this MOU to become a “Participating Local Government.” Local Governments may designate the appropriate individual from their entity to sign the MOU.
10. “Party” or “Parties” shall mean the State and/or Participating Local Government(s).
11. “Qualified Settlement Fund Account,” or “QSF Account,” shall mean an account set up as a qualified settlement fund, 468b fund, as authorized by Treasury Regulations 1.468B-1(c) (26 CFR §1.468B-1).
12. “Regional Council” shall have the meaning described in Section (F)(5), below.
13. “Settlement” shall mean the negotiated resolution of legal or equitable claims against an Opioid Settling Defendant when that resolution has been jointly entered into by the State and the Participating Local Governments, or by any individual Party or collection of Parties that opt to subject their Settlement to this MOU. Unless otherwise directed by an order from a United States Bankruptcy Court, “Settlement” shall also include distributions from any liquidation under Chapter 7 of the United States Bankruptcy Code or confirmed plan under Chapter 11 of the United States Bankruptcy Code that treats the claims of the State and Local Governments against an Opioid Settling Defendant.
14. “The State” shall mean the State of Colorado acting through its Attorney General and the Colorado Department of Law.

B. Allocation of Settlement Proceeds

1. All Opioid Funds shall be held in accordance with the terms of any Settlement. If a Settlement allows Opioid Funds to be held in a National Opioid Settlement Administrative Fund, then Opioid Funds shall be held in such National Opioid Settlement Administrative Fund. If a Settlement does not allow for Opioid Funds

to be held in a National Opioid Settlement Administrative Fund, Opioid Funds shall be held in a Colorado-specific QSF Account or, under the following limited circumstances, in the State’s Custodial Account: 1) if at the time of a Settlement, a Colorado-specific QSF Account is not yet established, although in such case, the Opioid Funds shall be transferred to the Colorado-specific QSF Account once it is established or 2) where the Abatement Fund Council determines Opioids Funds cannot be legally held in a Colorado-specific QSF Account. Regardless of whether Opioid Funds are held in a National Administrative Fund, a Colorado-specific QSF Account, or in the State’s Custodial Account, the Abatement Council shall appoint one of its members to serve as the point of contact in accordance Section (C)(4)(b)(i), below.

2. All Opioid Funds, at the time of a Settlement or at the time designated in the Settlement documents, shall be divided and distributed as follows:²
 - a. 10% directly to the State (“State Share”) for Approved Purposes in accordance with Section (D), below;
 - b. 20% directly to Participating Local Governments (“LG Share”) for Approved Purposes in accordance with Section (E), below;
 - c. 60% directly to Regions (“Regional Share”) for Approved Purposes in accordance with Section (F), below; and
 - d. 10% to specific abatement infrastructure projects (“Statewide Infrastructure Share”) for Approved Purposes in accordance with Section (G), below.
3. Distribution of the Shares in Section B(2)(a) – (d) shall be direct, meaning that funds held in accordance with Section B(1) shall be disbursed directly to the State, Participating Local Governments, Regions, and the Statewide Infrastructure Share according to the terms of this MOU.
4. All Opioid Funds, regardless of allocation, shall be used for Approved Purposes.
5. Participating Local Governments may elect to share, pool, or collaborate with their respective allocation of the LG or Regional Shares in any manner they choose, so long as such sharing, pooling, or collaboration is used for Approved Purposes and complies with the terms of this MOU and any Settlement.

C. General Abatement Fund Council

1. A General Abatement Fund Council (the “Abatement Council”), consisting of representatives appointed by the State and Participating Local Governments, shall

² This MOU treats multi-county health departments as county health departments for purposes of allocation and distribution of abatement proceeds and therefore multi-county health departments shall not receive any Opioid Funds directly. Third-Party Payors (“TPPs”) are not Parties to this MOU.

be created to ensure the distribution of Opioid Funds complies with the terms of any Settlement and to provide oversight of the Opioid Funds in accordance with the terms of this MOU.

2. **Membership:** The Abatement Council shall consist of the following thirteen (13) members, who shall serve in their official capacity only.

a. **State Members:** Seven (7) members shall be appointed by the State, as authorized volunteers of the State, as follows:

- (i) A Chair to serve as a non-voting member, except in the event of a tie;
- (ii) Two (2) members who are licensed professionals with significant experience in substance use disorders;
- (iii) Three (3) members who are professionals with significant experience in prevention, education, recovery, treatment, criminal justice, rural public health issues, or government administration related to substance use disorders; and
- (iv) One (1) member or family member affected directly by the opioid crisis.

b. **Local Government Members:** Six (6) members shall be appointed by the Participating Local Governments. Local Government Members shall be a County Commissioner, Mayor, City or Town Council Member, or a professional with significant experience in prevention, education, recovery, treatment, criminal justice, rural public health issues, or governmental administration related to substance use disorders. A Participating Local Government may determine which Local Government Members are eligible (or ineligible) to serve on the General Abatement Fund Council. County Commissioners, City or Town Council Members, and/or Mayors from the Regions identified in **Exhibit C** shall collaborate to appoint Local Government Members as follows:

- (i) Two (2) Members from Regions 1, 5, 13, 14, 15, 17, 18;
- (ii) Two (2) Members from Regions 2, 6, 7, 8, 9, 10, 11, 12, 16; and
- (iii) Two (2) Members from Regions 3, 4, 19.

c. **Terms:** The Abatement Council shall be established within ninety (90) days of the Effective Date. In order to do so, within sixty (60) days of the Effective Date, the State shall appoint the State Members in accordance with Section (C)(2)(a), and after conferral with the Local Governments, CCI and CML shall jointly appoint six (6) Local Government Members for an initial term not to exceed one year. Thereafter, Members shall be

appointed in accordance with this Section and Sections (C)(2)(a) and (b) and may serve no more than two (2) consecutive two-year terms, for a total of four (4) consecutive years. Except that, beginning in the second year only, two (2) State Members and two (2) Local Government members shall be appointed for a three-year term and may serve one consecutive two-year term thereafter. The Chair shall have no term but may be replaced at the State's discretion.

- (i) If a State or Local Government Member resigns or is otherwise removed from the Abatement Council prior to the expiration of their term, a replacement Member shall be appointed within sixty (60) days in accordance with Sections (C)(2)(a) and (b).
- (ii) If a Local Government Member vacancy exists for more than sixty (60) days, the State shall appoint a replacement Local Government Member to serve until the vacancy is filled in accordance with Section (C)(2)(b).

3. **Duties:** The Abatement Council is primarily responsible for ensuring that the distribution of Opioid Funds complies with the terms of this MOU. The Abatement Council is also responsible for oversight of Opioid Funds from the Regional Share in accordance with Section (F), below, and for developing processes and procedures for the distribution and oversight of Opioid Funds from the Statewide Infrastructure Share in accordance with Section (G) below.

4. **Governance:** The Abatement Council shall draft its own bylaws or other governing documents, which must include appropriate conflict of interest and dispute resolution provisions, in accordance with the terms of this MOU and the following principles:

- a. **Authority:** The Abatement Council does not have rulemaking authority. The terms of this MOU and any Settlement, as entered by any court of competent jurisdiction, including any bankruptcy court, control the authority of the Abatement Council and the Abatement Council shall not stray outside the bounds of the authority and power vested by this MOU and any Settlement.
- b. **Administration:** The Abatement Council shall be responsible for an accounting of all Opioid Funds. The Abatement Council shall be responsible for releasing Opioid Funds in accordance with Section (B)(1) for the Regional and Statewide Infrastructure Shares in Sections (B)(2)(c) and (d) and shall develop policies and procedures for the release and oversight of such funds in accordance with Sections (F) and (G). Should the Abatement Council require assistance with providing an accounting of Opioid Funds, it may seek assistance from the State.

- (i) The Abatement Council shall appoint one of its members to serve as a point of contact for the purpose of communicating with the entity holding Opioid Funds in accordance with Section (B)(1) and in that role shall only act as directed by the Abatement Council.
- c. **Transparency:** The Abatement Council shall operate with all reasonable transparency and operate in a manner consistent with all Colorado laws relating to open records and meetings regardless of whether the Abatement Council is otherwise obligated to comply with them.
 - (i) The Abatement Council shall develop a centralized public dashboard or other repository for the publication of expenditure data from any Party or Regional Council that receives Opioid Funds in accordance with Sections (D)-(G).
 - (ii) The Abatement Council may also require outcome related data from any Party or Regional Council that receives Opioid Funds in accordance with Sections (D)-(G) and may publish such outcome related data in the centralized public dashboard or other repository described above. In determining which outcome related data may be required, the Abatement Council shall work with all Parties and Regional Councils to identify appropriate data sets and develop reasonable procedures for collecting such data sets so that the administrative burden does not outweigh the benefit of producing such outcome related data.
 - (iii) For purposes of funding the centralized public dashboard or other repository described above, the Abatement Council shall make good faith efforts to seek funding from outside sources first, otherwise the State shall provide such funding.
- d. **Collaboration:** The Abatement Council shall facilitate collaboration between the State, Participating Local Governments, Regional Councils, and other stakeholders for the purposes of sharing data, outcomes, strategies, and other relevant information related to abating the opioid crisis in Colorado.
- e. **Decision Making:** The Abatement Council shall seek to make all decisions by consensus. In the event consensus cannot be achieved, unless otherwise required in this MOU, the Abatement Council shall make decisions by a majority vote of its Members. The Chair shall only vote in the event of a tie.
- f. **Due Process:** The Abatement Council shall develop the due process procedures required by Section (G)(3)(d) for Parties to dispute or challenge remedial actions taken by the Abatement Council for Opioid Funds from the Statewide Infrastructure Share. The Abatement Council

shall also abide by the due process principles required by Section (F)(12)-(13) for Regions to dispute or challenge remedial actions taken by the Abatement Council for Opioid Funds from the Regional Share.

- g. **Legal Status:** The Abatement Council shall not constitute a separate legal entity.
- h. **Legal Representation:** To the extent permitted by law, the State shall provide legal counsel to State Members for all legal issues arising from those State Members' work on the Abatement Council. At all times, Local Government Members of the Abatement Council are entitled to receive legal representation from their respective governmental entities. In the event of a conflict, the Abatement Council and its members may retain the services of other legal counsel.
- i. **Compensation:** No member of the Abatement Council shall be compensated for their work related to the Abatement Council.

D. State Share

- 1. In accordance with Sections (B)(1) and (B)(2)(a), and the terms of any Settlement, the State Share shall be paid directly to the State in accordance with the terms of this Section (D).
- 2. The State maintains full discretion over distribution of the State Share anywhere within the State of Colorado, however, the State Share shall be used for Approved Purposes only. The State will work to reduce administrative costs as much as practicable.
- 3. On an annual basis, as determined by the Abatement Council, the State shall provide all expenditure data, including administrative costs, from the State Share to the Abatement Council for purposes of maintaining transparency in accordance with Section (C)(4)(c)(i). The Abatement Council may require the State to provide additional outcome-related data in accordance with Section (C)(4)(c)(ii) and the State shall comply with such requirements.
- 4. If the State disputes the amount of Opioid Funds it receives from the State Share, the State shall alert the Abatement Council within sixty (60) days of discovering the information underlying the dispute. Failure to alert the Abatement Council within this time frame shall not constitute a waiver of the State's right to seek recoupment of any deficiency in its State Share.

E. LG Share

- 1. In accordance with Sections (B)(1) and (B)(2)(b), and the terms of any Settlement, the LG Share shall be paid directly to Participating Local Governments in accordance with the terms of this Section (E).

2. Allocations to Participating Local Governments from the LG Share shall first be determined using the percentages shown in **Exhibit D**.
3. The LG Share for each County Area shall then be allocated among the county and the other Participating Local Governments within it. **Exhibit E** reflects the default allocation that will apply unless the Participating Local Governments within a County Area enter into a written agreement providing for a different allocation. The Participating Local Governments may elect to modify the allocation for a County Area in **Exhibit E**, but such modification to the allocation in **Exhibit E** shall not change a County Area's total allocation under Section (E)(2).
4. A Local Government that chooses not to become a Participating Local Government will not receive a direct allocation from the LG Share. The portion of the LG Share that would have been allocated to a Local Government that is not a Participating Local Government will instead be re-allocated to the Regional Share for the Region where the Local Government is located, in accordance with Section (F), below.
5. In the event a Participating Local Government dissolves or ceases to exist during the term of any Settlement, the allocation for that Participating Local Government from the LG Share shall be re-allocated as directed by any Settlement, and if not specified, be re-allocated to the Regional Share for the Region in which the Participating Local Government was located, in accordance with Section (F). If a Participating Local Government merges with another Participating Local Government, the allocation for that Participating Local Government from the LG Share shall be re-allocated as directed by any Settlement, and if not specified, shall be re-allocated to the successor Participating Local Government's allocation of the LG Share. If a Participating Local Government merges with a Local Government that is not a Participating Local Government, the allocation for that Participating Local Government from the LG Share shall be re-allocated as directed by any Settlement, and if not specified, be re-allocated to the Region in which the merging Participating Local Government was located, in accordance with Section (F), below.
6. A Participating Local Government may forego its allocation of the LG Share and direct its allocation to the Regional Share for the Region where the Participating Local Government is located, in accordance with Section (F) below, by affirmatively notifying the Abatement Council on an annual basis of its decision to forego its allocation of the LG Share. A Participating Local Government's election to forego its allocation of the LG Share shall carry over to the following year unless the Participating Local Government notifies the Abatement Council otherwise. If a Participating Local Government elects to forego its allocation of the LG Share, the Participating Local Government shall be excused from the reporting requirements required by Section (E)(8).
7. Participating Local Governments maintain full discretion over the distribution of their allocation of the LG Share anywhere within the State of Colorado, however,

all Participating Local Governments shall use their allocation from the LG Share for Approved Purposes only. Reasonable administrative costs for a Participating Local Government to administer its allocation of the LG Share shall not exceed actual costs or 10% of the Participating Local Government's allocation of the LG Share, whichever is less.

8. On an annual basis, as determined by the Abatement Council, all Participating Local Governments shall provide all expenditure data, including administrative costs, from their allocation of the LG Share to the Abatement Council for purposes of maintaining transparency in accordance with Section (C)(4)(c)(i). The Abatement Council may require Participating Local Governments to provide additional outcome related data in accordance with Section (C)(4)(c)(ii) and all Participating Local Governments shall comply with such requirements.
9. If any Participating Local Government disputes the amount of Opioid Funds it receives from its allocation of the LG Share, the Participating Local Government shall alert the Abatement Council within sixty (60) days of discovering the information underlying the dispute. Failure to alert the Abatement Council within this time frame shall not constitute a waiver of the Participating Local Government's right to seek recoupment of any deficiency in its LG Share.

F. Regional Share

1. In accordance with Sections (B)(1) and (B)(2)(c), and the terms of any Settlement, the Regional Share shall be paid to the Regions in accordance with the terms of this Section (F).
2. Participating Local Governments shall organize themselves into the Regions depicted in **Exhibit C**. Municipalities located in multiple Regions may join all or some of the Regions in which they are located according to **Exhibit C**.
3. Allocations to Regions will be distributed according to **Exhibit F**. For multi-county Regions, each Region's share listed in **Exhibit F** is calculated by summing the individual percentage shares listed in **Exhibit D** for the counties within that Region. The percentages in **Exhibit F** are based on the assumption that every Local Government in each Region becomes a Participating Local Government.
4. In the event a city, town, or other municipality that is a Participating Local Government merges, dissolves, or ceases to exist during the term of any Settlement, the allocation of the Regional Share owed to the Region in which that Participating Local Government existed shall be re-allocated as directed by any Settlement, and if not specified, shall not be modified from **Exhibit F**. If a county that is a Participating Local Government merges with another county within its Region, the allocation of the Regional Share owed to the Region in which that county existed shall be re-allocated as directed by any Settlement, and if not specified, shall not be modified from **Exhibit F**. If a county that is a Participating Local Government merges with a county in a different Region during the term of

any Settlement, the allocation of the Regional Share owed to the Region in which that county existed shall be re-allocated as directed by any Settlement, and if not specified, shall be re-allocated to the Region in which that Participating Local Government merged in accordance with **Exhibit F**.

5. Each Region must create its own Regional Council while giving consideration to the regional governance models illustrated in **Exhibit G**. The Regional Council must be formed by the Participating Local Governments within the Region and each Regional Council shall designate a fiscal agent for the Region. Regional fiscal agents shall be county or municipal governments only. All funds from the Regional Share shall be distributed to the Regional Council's identified fiscal agent for the benefit of the entire Region.
 - a. Subject to this Section F(5), each Region may draft its own intra-regional agreements, bylaws, or other governing documents to determine how the Regional Council will operate. However, each voting member of a Regional Council shall be an employee or elected official of a Participating Local Government within the applicable Region. In the case of Denver, the voting members of its Regional Council shall be appointed by the Mayor. In the case of Broomfield, the voting members of its Regional Council shall be appointed by the Broomfield City and County Manager.
 - b. The Region shall not receive any Opioid Funds from the Regional Share until the Region certifies to the Abatement Council that its Regional Council has been formed and a fiscal agent has been designated. Such certification shall be in a simple form adopted by the Region and may be made via email, so long as it includes the names and affiliations of the Regional Council's members and the designated fiscal agent.
 - c. If a Region does not form and certify its Regional Council and designate its fiscal agent within one-hundred and eighty (180) days of the Effective Date, the Abatement Council shall appoint members to the Region's Regional Council. Regional Council members appointed by the Abatement Council shall serve until the Region certifies the formation of its Regional Council to the Abatement Council.
 - d. A Region shall submit a renewed certification required by Section (F)(5)(b), above, when its membership changes.
 - e. If a membership vacancy exists on a Regional Council for more than ninety (90) days and the Regional Council is unable to fill the vacancy by its regular procedures during that time, the Abatement Council shall appoint a replacement member to serve until the Region fills the vacancy.

6. A Local Government that chooses not to become a Participating Local Government shall not receive any Opioid Funds from the Regional Share or participate in the Regional Councils described in Section (F)(5) above.
7. Each Regional Council shall make requests to the Abatement Council for Opioid Funds from their allocation of the Regional Share. Each Regional Council's request for Opioid Funds from the Regional Share shall be accompanied by a 2-year plan identifying the Approved Purposes for which the requested funds will be used by the Region anywhere within the State of Colorado. A Regional Council's 2-year plan may be amended so long as such amendments comply with the terms of this MOU and any Settlement. Any Regional Council may seek assistance from the Abatement Council for purposes of developing its 2-year plan.
8. Reasonable administrative costs for a Regional Council to administer its Region's allocation of the Regional Share shall not exceed actual costs or 10% of the Region's allocation of the Regional Share, whichever is less.
9. The Abatement Council shall release funds requested by a Regional Council in accordance with Section (B)(1) if the Regional Council's 2-year plan complies with the Approved Purposes, the terms of this MOU, and the terms of any Settlement. The Abatement Council shall not deny any funding request from a Regional Council on the basis that the Abatement Council does not approve or agree with the Approved Purposes for which a Regional Council requests Opioid Funds from the Regional Share. Nor may the Abatement Council hold up, delay, or make unreasonable requests for additional or supporting information of the Regional Council prior to releasing the requested Opioid Funds. The purpose of this MOU is to facilitate Opioid Funds to their intended recipients quickly and efficiently with minimal administrative procedure.
10. On an annual basis, as determined by the Abatement Council, each Regional Council's fiscal agent shall provide to the Abatement Council the Regional Council's expenditure data, including administrative costs, from their allocation of the Regional Share and certify to the Abatement Council that the Regional Council's expenditures were for Approved Purposes and complied with its 2-year plan. The Regional Council shall subject itself to an accounting at the Abatement Council's discretion.
 - a. The Abatement Council shall review a Regional Council's expenditure data and certification to ensure compliance with the Regional Council's 2-year plan, the Approved Purposes, and the terms of this MOU and any Settlement.
 - b. The Abatement Council shall publish the Regional Council's expenditure data, including administrative costs, from the Regional Share in accordance with Section (C)(4)(c)(i). The Abatement Council may require Regional Councils to provide additional outcome related data in

accordance with Section (C)(4)(c)(ii) and all Regional Councils shall comply with such requirements.

11. If any Regional Council disputes the amount of Opioid Funds it receives from its allocation of the Regional Share, the Regional Council shall alert the Abatement Council within sixty (60) days of discovering the information underlying the dispute. Failure to alert the Abatement Council within this time frame shall not constitute a waiver of the Regional Council's right to seek recoupment of any deficiency in its Regional Share.
12. If the Abatement Council has reason to believe a Region's expenditure of its allocation of the Regional Share did not comply with the Region's 2-year Plan, the Approved Purposes, the terms of this MOU or any Settlement, as described in this Section (F), or that the Region otherwise misused its allocation of the Regional Share, the Abatement Council may take remedial action against the alleged offending Region. Such remedial action is left to the discretion of the Abatement Council and may include but not be limited to, withholding future Opioids Funds owed to the offending Region or requiring the offending Region to reimburse improperly expended Opioid Funds to the Regional Share.
13. Within one hundred and twenty (120) days of the Abatement Council being formed, in accordance with Section (C)(2)(c) above, the Abatement Council shall develop and publish due process procedures for allowing a Region to challenge or dispute any remedial action taken by the Abatement Council, including timelines during which the Region may engage in such a challenge or dispute. Such due process procedures shall reflect, at a minimum, the following principles:
 - a. Upon learning of any conduct that may warrant remedial action against a Region, the Abatement Council shall first provide notice to the Region of the conduct at issue, provide the Region an opportunity to respond, and, if appropriate, cure the alleged offending conduct. If after providing the Region such notice and opportunities to respond and cure, the Abatement Council continues to believe remedial action is warranted, the Abatement Council may take such remedial action.
 - b. If the Abatement Council decides to take remedial action against an alleged offending Region, such action may only occur by a two-thirds supermajority vote of the Abatement Council. Thus, an Abatement Council made up of twelve (12) voting members requires a vote of eight (8) Members prior to taking remedial action against an alleged offending Region.
 - c. Prior to taking any remedial action against an alleged offending Region, the Abatement Council shall first provide notice to the alleged offending Region of the remedial action to be taken and the facts underlying such remedial action. The Abatement Council shall then provide the alleged

offending Region an opportunity to challenge or dispute the remedial action in accordance with, at a minimum, the principles below:

- i. The alleged offending Region may request revisions or modifications to the proposed remedial action;
 - ii. The alleged offending Region may submit a written response to and/or request a hearing before the Abatement Council, or a third-party hearing officer,³ regarding the alleged offending conduct and proposed remedial action; and
 - iii. After such written responses are submitted and reviewed and/or a hearing is conducted, the alleged offending Region may submit an appeal to the Abatement Council of the decision to take remedial action.
- d. Remedial actions taken by the Abatement Council, in accordance with the due process principles detailed above, shall be considered final non-appealable orders and offending Regions may not seek judicial relief from remedial action taken by the Abatement Council, except as provided in Section (H), below.
- e. Subject to Section (H)(2), below, if any Party(ies) believes the Abatement Council violated the terms of this MOU, such Party(ies) may seek to enforce the terms of this MOU.

14. If the Abatement Council has reason to believe a Region's conduct, or the conduct of any Participating Local Government or individual in that Region, amounts to a violation of any criminal law, the Abatement Council shall refer such matters to the appropriate authorities and may consider such conduct in its determination of any remedial action to be taken.

15. If the Abatement Council has reason to believe that an individual involved in the receipt or administration of Opioid Funds from the Regional Share has violated any applicable ethics rules or codes, the Abatement Council shall not attempt to adjudicate such a violation. In such instances, the Abatement Council shall lodge a complaint with the appropriate forum for handling such ethical matters, such as a local home rule municipality's ethics board.

16. Costs associated with the Abatement Council's distribution and oversight of the Regional Share, as described above in this Section (F), including costs associated with any remedial action by the Abatement Council, shall be paid from the Statewide

³ Only an alleged offending Region may request the appointment of a third-party hearing officer to review any written responses and conduct any requested hearings. If an alleged offending Region makes such a request, the Abatement Council has sole discretion to appoint the third-party hearing officer and the alleged offending Region shall bear the cost of such review and/or hearing by the third-party hearing officer.

Infrastructure Share. The Abatement Council shall make all good faith efforts to limit such costs to the greatest extent possible.

G. Statewide Infrastructure Share

1. In accordance with Sections B(1) and (B)(2)(d), and the terms of any Settlement, the Statewide Infrastructure Share shall be paid to any Party or Regional Council in accordance with this Section (G).
2. The purpose of the Statewide Infrastructure Share is to promote capital improvements and provide operational assistance for developing or improving the infrastructure necessary to abate the opioid crisis anywhere within the State of Colorado. The Statewide Infrastructure Share is intended to supplement Opioid Funds received by any Party or Region.
3. Prior to distributing any Opioid Funds from the Statewide Infrastructure Share, the Abatement Council shall establish and publish policies and procedures for the distribution and oversight of the Statewide Infrastructure Share, including processes for Parties or Regions to apply for Opioid Funds from the Statewide Infrastructure Share. The Abatement Council's policies and procedures shall, at a minimum, reflect the following principles:
 - a. Opioid Funds from the Statewide Infrastructure Share shall be used for Approved Purposes only;
 - b. Opioid Funds from the Statewide Infrastructure Share shall be paid directly to the appropriate state agencies (including but not limited to the Colorado Department of Law), Regional fiscal agents, or Participating Local Governments only;
 - c. Distribution and oversight of the Statewide Infrastructure Share shall comply with the terms of this MOU and any Settlement;
 - d. Appropriate processes for remedial action will be taken against Parties or Regions that misuse Opioid Funds from the Statewide Infrastructure Share. Such processes shall include procedures for alleged offending Parties or Regions to challenge or dispute such remedial action; and
 - e. Limitations on administrative costs to be expended by recipients for administering Opioid Funds received from the Statewide Infrastructure Fund, not to exceed actual costs expended by the recipient or 10% of the amount received, whichever is less.
4. The distribution and oversight policies and procedures developed by the Abatement Council, in accordance with Section (G)(3), shall be non-appealable orders and no Party or Region may seek judicial relief related to the distribution and oversight of the Statewide Infrastructure Share.

5. On an annual basis, as determined by the Abatement Council, any Party or Regional Council that receives funds from the Statewide Infrastructure Share shall provide all expenditure data, including administrative costs, related to any Opioid Funds it received from the Statewide Infrastructure Share and subject itself to an accounting as required by the Abatement Council. The Abatement Council shall publish all expenditure data from the Statewide Infrastructure Share in accordance with Section (C)(4)(c)(i). The Abatement Council may require the Parties or Regional Councils that receive funds from the Statewide Infrastructure Share to provide additional outcome related data in accordance with Section (C)(4)(c)(ii) and the Parties or Regional Councils shall comply with such requirements.
6. Costs associated with the Abatement Council's distribution and oversight of the Statewide Infrastructure Share, as described in this Section (G), shall be paid for from the Statewide Infrastructure Share. The Abatement Council shall make all good faith efforts to limit such costs to the greatest extent possible.

H. General Terms

1. All Parties and Regional Councils shall maintain all records related to the receipt and expenditure of Opioid Funds for no less than five (5) years and shall make such records available for review by the Abatement Council, any other Party or Regional Council, or the public. Records requested by the public shall be produced in accordance with Colorado's open records laws. Records requested by the Abatement Council or another Party or a Regional Council shall be produced within twenty-one (21) days of the date the record request was received. This requirement does not supplant any Party or Regional Council's obligations under Colorado's open records laws.
2. If any Party(ies) believes the Abatement Council has violated the terms of this MOU, the alleging Party(ies) may seek to enforce the terms of this MOU, provided the alleging Party(ies) first provides notice to the Abatement Council of the alleged violation and a reasonable opportunity to cure the alleged violation. In such an enforcement action, the alleging Party(ies) may only seek to enforce the terms of the MOU against the State and the Participating Local Governments from which the Local Government Members of the Abatement Council were appointed and may only seek declaratory and/or injunctive relief. In defense of such an enforcement action, the State's Members of the Abatement Council shall be represented by the State and the Local Government Members shall be represented by the Participating Local Governments from which the Local Government Members were appointed. In the event of a conflict, the Abatement Council and its Members may seek outside representation to defend itself against such an enforcement action.
3. If any Party(ies) believes another Party(ies), not including the Abatement Council, violated the terms of this MOU, the alleging Party(ies) may seek to enforce the terms of this MOU in the court in which any applicable Settlement(s) was entered, provided the alleging Party(ies) first provide the alleged offending Party(ies)

notice of the alleged violation(s) and a reasonable opportunity to cure the alleged violation(s). In such an enforcement action, any alleging Party or alleged offending Party(ies) may be represented by their respective public entity in accordance with Colorado law.

4. Nothing in this MOU shall be interpreted to waive the right of any Party to seek judicial relief for conduct occurring outside the scope of this MOU that violates any Colorado law. In such an action, the alleged offending Party(ies), including the Abatement Council, may be represented by their respective public entities in accordance with Colorado law. In the event of a conflict, any Party, including the Abatement Council and its Members, may seek outside representation to defend itself against such an action.
5. If any Party(ies) believes another Party(ies), Region(s), or individual(s) involved in the receipt, distribution, or administration of Opioids Funds has violated any applicable ethics codes or rules, a complaint shall be lodged with the appropriate forum for handling such matters, such as a local home rule municipality's ethics board.
6. If any Party(ies) believes another Party(ies), Region(s), or individual(s) involved in the receipt, distribution, or administration of Opioid Funds violated any Colorado criminal law, such conduct shall be reported to the appropriate criminal authorities.
7. Venue for any legal action related to this MOU shall be in a court of competent jurisdiction where any applicable Settlement(s) is entered.
8. Because recovery under the terms of different Settlement(s) may vary depending on the number of Parties required to effectuate a Settlement, the Parties may conditionally agree to sign on to the MOU through a letter of intent, resolution or similar written statement, declaration or pronouncement declaring their intent to sign on to the MOU if the threshold for Party participation in a specific Settlement is achieved.⁴
9. This MOU may be executed in two or more counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same instrument. The Parties approve the use of electronic signatures for execution of this MOU. All use of electronic signatures shall be governed by the Uniform Electronic Transactions Act, C.R.S. §§ 24-71.3-101, *et seq.* The Parties agree not to deny the legal effect or enforceability of the MOU solely because it is in electronic form or

⁴ For instance, the July 21, 2021 "Distributor Settlement Agreement" includes a "Subdivision Settlement Agreement Form" that, once filled out and executed, is meant to indicate that Local Government's (or Subdivision's) election to participate in that Distributor Settlement and also, to require that Local Government to take steps to formally release any claim it may have against the Settling Distributors. With regard to the Distributor Settlement Agreement or any other Settlements that include a form similar to the Subdivision Settlement Agreement Form, the Parties may still conditionally agree to sign on to the MOU if, for instance, the threshold for Party participation in a specific Settlement is achieved.

because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the MOU in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

10. Each party represents that all procedures necessary to authorize such Party's execution of this MOU have been performed and that the person signing for such Party has been authorized to execute the MOU.

I. Payment of Counsel and Litigation Expenses Through a Back-Stop Fund

1. Some Settlements, including the McKesson Corporation, Cardinal Health, Inc., and AmerisourceBergen Corporation (“Distributor”) and Johnson & Johnson/Janssen (“J&J”) settlements, may provide for the payment of all or a portion of the fees and litigation expenses owed by Participating Local Governments to counsel specifically retained to file suit in the opioid litigation. If any Settlement is insufficient to cover the fee obligations of the Participating Local Governments (as discussed and modified by Judge Polster’s Order of August 6 regarding fees for the Distributor and J&J settlements), the deficiencies will be covered as set forth in further detail below.
2. The Parties also recognize that, as in the Distributor and J&J settlements, certain Opioid Settling Defendants may offer premiums benefiting the entire state of Colorado when Participating Local Governments agree to the Settlement(s), thereby settling their claims in their on-going lawsuits. For example, below is the chart illustrating how Incentive Payment B (a 25% premium to the entire state) works in the Distributor Settlement at Section IV.F.2.b (p. 20):

Percentage of Litigating Subdivision Population that is Incentive B Eligible Subdivision Population ⁵	Incentive Payment B Eligibility Percentage
Up to 85%	0%
85%+	30%
86+	40%
91+	50%
95+	60%
99%+	95%
100%	100%

3. If the court in *In Re: National Prescription Opiate Litigation*, MDL No. 2804 (N.D. Ohio), or if a Settlement establishes a common benefit fund or similar device to compensate attorneys for services rendered and expenses incurred that have benefited plaintiffs generally in the litigation (the “Common Benefit Fund”),

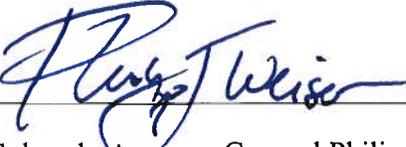
and/or requires certain governmental plaintiffs to pay a share of their recoveries from defendants into the Common Benefit Fund (“Court-Ordered Common Benefit Fund Assessment”), then the Participating Local Governments shall be required to first seek to have their attorneys’ fees and expenses paid through the Common Benefit Fund.

4. For the Distributor and J&J settlements only, counsel for Participating Local Governments shall have their expenses otherwise recoverable from Colorado Participating Local Governments compensated only through the Common Benefit Fund(s) established in those settlement(s). For the avoidance of doubt, counsel for Participating Local Governments may recover their attorneys’ fees through the Distributor and J&J settlements and through the other applicable provisions of this Section (I).
5. In addition, as a means of covering any deficiencies in paying counsel for Participating Local Governments, a supplemental Colorado Attorney Fee Back-Stop Fund shall be established. The Colorado Attorney Fee Back-Stop Fund is to be used to compensate counsel for Participating Local Governments that filed an initial complaint in the opioid litigation by September 1, 2020 (“Litigating Participating Local Governments”).
6. Payments out of the Colorado Attorney Fee Back-Stop Fund shall be determined by a committee (the “Opioid Fee and Expense Committee”). The Opioid Fee and Expense Committee shall consist of the following five (5) members:
 - a. One (1) member appointed by CCI from a litigating county or from a litigating county and city municipal corporation;
 - b. One (1) member appointed by CML from a litigating city;
 - c. One (1) member appointed jointly by CCI and CML from a non-litigating county or city;
 - d. One (1) member appointed by the Attorney General’s Office; and
 - e. One (1) neutral member jointly appointed by all of the other members listed above.
7. The Colorado Attorney Fee Back-Stop Fund shall be funded as follows from any Settlement, excluding settlements involving McKinsey and payments resulting from the Purdue or Mallinckrodt bankruptcy. For purposes only of calculating the funding of the Colorado Attorney Fee Back-Stop Fund, the Parties deem 58% of the total LG Share and Regional Share to be attributable to the Litigating Local Governments. The Colorado Attorney Fee Back-Stop Fund shall be funded by 8.7% of the total LG Share and 4.35% of the total Regional Share at the time such funds are actually received. No funds deposited into the Colorado Attorney Fee Back-Stop Fund will be taken from the Statewide Infrastructure Share or State Share.

8. Counsel for Litigating Participating Local Governments may apply to the Colorado Attorney Fee Back-Stop Fund only after applying to the Common Benefit Fund.
9. Counsel for Litigating Participating Local Governments may apply to the Colorado Attorney Fee Back-Stop Fund for only a shortfall – that is, the difference between what their fee agreements would entitle them to (as limited by this Section (I)) minus what they have already collected from the Common Benefit Fund (including both the “common benefit” and “contingency fee” calculations, if any). If they receive fees/costs for common benefit work in the national fee fund, these fees/costs will be allocated proportionately across all their local government opioid clients based on the allocation model used in the Negotiation Class website to allocate the appropriate portion to Colorado clients.
10. Counsel for Litigating Participating Local Governments are limited to being paid, at most, and assuming adequate funds are available in any Common Benefit Fund and Colorado Attorney Fee Back-Stop Fund, fees in an amount equal to 15% of the LG Share and 7.5% of the Regional Share attributable to their Colorado clients.
11. Any funds remaining in the Colorado Attorney Fee Back-Stop Fund in excess of the amounts needed to cover the fees and litigation expenses owed by Litigating Participating Local Governments to their respective counsel shall revert to the Participating Local Governments according to the allocations described in Sections (E) and (F). Every two years, the Opioid Fee and Expense Committee shall assess the amount remaining in the Colorado Attorney Fee Back-Stop Fund to determine if it is overfunded.
12. Despite the fact that a litigating entity bonus benefits the entire state, no portion of the State Share shall be used to fund the Colorado Attorney Fee Back-Stop Fund or in any other way to fund any Participating Local Government’s attorneys’ fees and expenses. Because the state did not hire outside counsel, any funds for attorneys fees that the state receives from the J&J and Distributor settlement will be deposited into the State Share.
13. To participate in the Colorado Attorney Fee Back-Stop Fund, counsel must follow the requirements of C.R.S. § 13-17-304.

This **Colorado Opioids Settlement Memorandum of Understanding** is signed

this 26 day of August, 2021 by:



Colorado Attorney General Philip J. Weiser

This **Colorado Opioids Settlement Memorandum of Understanding** is signed
this ___ day of _____, _____ by:

Name & Title _____

On behalf of _____

Exhibit A

POTENTIAL OPIOID ABATEMENT APPROVED PURPOSES

I. TREATMENT

A. TREATMENT OF OPIOID USE DISORDER AND ITS EFFECTS

1. Expand availability of treatment, including Medication-Assisted Treatment (MAT), for Opioid Use Disorder (OUD) and any co-occurring substance use or mental health issues.
2. Supportive housing, all forms of FDA-approved MAT, counseling, peer-support, recovery case management and residential treatment with access to medications for those who need it.
3. Treatment of mental health trauma issues that resulted from the traumatic experiences of the opioid user (e.g., violence, sexual assault, human trafficking) and for family members (e.g., surviving family members after an overdose or overdose fatality).
4. Expand telehealth to increase access to OUD treatment, including MAT, as well as counseling, psychiatric support, and other treatment and recovery support services.
5. Fellowships for addiction medicine specialists for direct patient care, instructors, and clinical research for treatments.
6. Scholarships for certified addiction counselors.
7. Clinicians to obtain training and a waiver under the federal Drug Addiction Treatment Act to prescribe MAT for OUD.
8. Training for health care providers, students, and other supporting professionals, such as peer recovery coaches/recovery outreach specialists, including but not limited to training relating to MAT and harm reduction.
9. Dissemination of accredited web-based training curricula, such as the American Academy of Addiction Psychiatry's Provider Clinical Support Service-Opioids web-based training curriculum and motivational interviewing.
10. Development and dissemination of new accredited curricula, such as the American Academy of Addiction Psychiatry's Provider Clinical Support Service Medication-Assisted Treatment.
11. Development of a multistate/nationally accessible database whereby health care providers can list currently available in-patient and out-patient OUD treatment services that are accessible on a real-time basis.

12. Support and reimburse services that include the full American Society of Addiction Medicine (ASAM) continuum of care for OUD.
13. Improve oversight of Opioid Treatment Programs (OTPs) to assure evidence-informed practices such as adequate methadone dosing.

B. INTERVENTION

1. Ensure that health care providers are screening for OUD and other risk factors and know how to appropriately counsel and treat (or refer, if necessary) a patient for OUD treatment.
2. Fund Screening, Brief Intervention and Referral to Treatment (SBIRT) programs to reduce the transition from use to disorder.
3. Training and long-term implementation of SBIRT in key systems (health, schools, colleges, criminal justice, and probation), with a focus on the late adolescence and young adulthood when transition from misuse to opioid disorder is most common.
4. Purchase automated versions of SBIRT and support ongoing costs of the technology.
5. Training for emergency room personnel treating opioid overdose patients on post-discharge planning, including community referrals for MAT, recovery case management and/or support services.
6. Support work of Emergency Medical Systems, including peer support specialists, to connect individuals to treatment or other appropriate services following an opioid overdose or other opioid-related adverse event.
7. Create school-based contacts whom parents can engage to seek immediate treatment services for their child.
8. Develop best practices on addressing OUD in the workplace.
9. Support assistance programs for health care providers with OUD.
10. Engage non-profits and faith community as a system to support outreach for treatment.

C. CRIMINAL-JUSTICE-INVOLVED PERSONS

1. Address the needs of persons involved in the criminal justice system who have OUD and any co-occurring substance use disorders or mental health (SUD/MH) issues.

2. Support pre-arrest diversion and deflection strategies for persons with OUD and any co-occurring SUD/MH issues, including established strategies such as:
 - a. Self-referral strategies such as Angel Programs or the Police Assisted Addiction Recovery Initiative (PAARI);
 - b. Active outreach strategies such as the Drug Abuse Response Team (DART) model;
 - c. “Naloxone Plus” strategies, which work to ensure that individuals who have received Naloxone to reverse the effects of an overdose are then linked to treatment programs;
 - d. Officer prevention strategies, such as the Law Enforcement Assisted Diversion (LEAD) model; or
 - e. Officer intervention strategies such as the Leon County, Florida Adult Civil Citation Network.
3. Support pre-trial services that connect individuals with OUD and any co-occurring SUD/MH issues to evidence-informed treatment, including MAT, and related services.
4. Support treatment and recovery courts for persons with OUD and any co-occurring SUD/MH issues, but only if they provide referrals to evidence-informed treatment, including MAT.
5. Provide evidence-informed treatment, including MAT, recovery support, harm reduction, or other appropriate services to individuals with OUD and any co-occurring SUD/MH issues who are incarcerated, on probation, or on parole.
6. Provide evidence-informed treatment, including MAT, recovery support, harm reduction, or other appropriate re-entry services to individuals with OUD and any co-occurring SUD/MH issues who are leaving jail or prison or who have recently left jail or prison.
7. Support critical time interventions (CTI), particularly for individuals living with dual-diagnosis OUD/serious mental illness, and services for individuals who face immediate risks and service needs and risks upon release from correctional settings.

D. WOMEN WHO ARE OR MAY BECOME PREGNANT

1. Evidence-informed treatment, including MAT, recovery, and prevention services for pregnant women or women who could become pregnant and have OUD.
2. Training for obstetricians and other healthcare personnel that work with pregnant women and their families regarding OUD treatment.

3. Other measures to address Neonatal Abstinence Syndrome, including prevention, care for addiction and education programs.
4. Child and family supports for parenting women with OUD.
5. Enhanced family supports and child care services for parents receiving treatment for OUD.

E. PEOPLE IN TREATMENT AND RECOVERY

1. The full continuum of care of recovery services for OUD and any co-occurring substance use or mental health issues, including supportive housing, residential treatment, medical detox services, peer support services and counseling, community navigators, case management, and connections to community-based services.
2. Identifying successful recovery programs such as physician, pilot, and college recovery programs, and providing support and technical assistance to increase the number and capacity of high-quality programs to help those in recovery.
3. Training and development of procedures for government staff to appropriately interact and provide social and other services to current and recovering opioid users, including reducing stigma.
4. Community-wide stigma reduction regarding treatment and support for persons with OUD, including reducing the stigma on effective treatment.
5. Engaging non-profits and faith community as a system to support family members in their efforts to help the opioid user in the family.

II. PREVENTION

F. PRESCRIBING PRACTICES

1. Training for health care providers regarding safe and responsible opioid prescribing, dosing, and tapering patients off opioids.
2. Academic counter-detailing.
3. Continuing Medical Education (CME) on prescribing of opioids.
4. Support for non-opioid pain treatment alternatives, including training providers to offer or refer to multi-modal, evidence-informed treatment of pain.
5. Fund development of a multistate/national prescription drug monitoring program (PDMP) that permits information sharing while providing appropriate safeguards on sharing of private information, including but not limited to:

- a. Integration of PDMP data with electronic health records, overdose episodes, and decision support tools for health care providers relating to OUD.
 - b. Ensuring PDMPs incorporate available overdose/naloxone deployment data, including the United States Department of Transportation's Emergency Medical Technician overdose database.
6. Educating dispensers on appropriate opioid dispensing.

G. MISUSE OF OPIOIDS

1. Corrective advertising/affirmative public education campaigns.
2. Public education relating to drug disposal.
3. Drug take-back disposal or destruction programs.
4. Fund community anti-drug coalitions that engage in drug-abuse prevention efforts.
5. School-based programs that have demonstrated effectiveness in preventing drug misuse and seem likely to be effective in preventing the uptake and use of opioids.
6. Support community coalitions in implementing evidence-informed prevention, such as reduced social access and physical access, stigma reduction – including staffing, educational campaigns, or training of coalitions in evidence-informed implementation.
7. School and community education programs and campaigns for students, families, school employees, school athletic programs, parent-teacher and student associations, and others.
8. Engaging non-profits and faith community as a system to support prevention.

H. OVERDOSE DEATHS AND OTHER HARMS

1. Increasing availability and distribution of naloxone and other drugs that treat overdoses to first responders, overdose patients, opioid users, families and friends of opioid users, schools, community navigators and outreach workers, drug offenders upon release from jail/prison, and other members of the general public.
2. Training and education regarding naloxone and other drugs that treat overdoses for first responders, overdose patients, patients taking opioids, families, schools, and other members of the general public.

3. Developing data tracking software and applications for overdoses/naloxone revivals.
4. Public education relating to emergency responses to overdoses.
5. Free naloxone for anyone in the community.
6. Public education relating to immunity and Good Samaritan laws.
7. Educating first responders regarding the existence and operation of immunity and Good Samaritan laws.
8. Syringe service programs, including supplies, staffing, space, peer support services, and the full range of harm reduction and treatment services provided by these programs.
9. Expand access to testing and treatment for infectious diseases such as HIV and Hepatitis C resulting from intravenous opioid use.

III. ADDITIONAL AREAS

I. SERVICES FOR CHILDREN

1. Support for children's services: Fund additional positions and services, including supportive housing and other residential services, relating to children being removed from the home and/or placed in foster care due to custodial opioid use.

J. FIRST RESPONDERS

1. Law enforcement expenditures relating to the opioid epidemic.
2. Educating first responders regarding appropriate practices and precautions when dealing with fentanyl or other drugs.
3. Increase electronic prescribing to prevent diversion and forgery.

K. COMMUNITY LEADERSHIP

1. Regional planning to identify goals for opioid reduction and support efforts or to identify areas and populations with the greatest needs for treatment intervention services.
2. Government dashboard to track key opioid-related indicators and supports as identified through collaborative community processes.

L. STAFFING AND TRAINING

1. Funding for programs and services regarding staff training and networking to improve staff capability to abate the opioid crisis.
2. Support infrastructure and staffing for collaborative cross-systems coordination to prevent opioid misuse, prevent overdoses, and treat those with OUD (e.g., health care, primary care, pharmacies, PDMPs, etc.).

M. RESEARCH

1. Funding opioid abatement research.
2. Research improved service delivery for modalities such as SBIRT that demonstrate promising but mixed results in populations vulnerable to OUD.
3. Support research for novel harm reduction and prevention efforts such as the provision of fentanyl test strips.
4. Support for innovative supply-side enforcement efforts such as improved detection of mail-based delivery of synthetic opioids.
5. Expanded research for swift/certain/fair models to reduce and deter opioid misuse within criminal justice populations that build upon promising approaches used to address other substances (e.g. Hawaii HOPE and Dakota 24/7).
6. Research expanded modalities such as prescription methadone that can expand access to MAT.

N. OTHER

1. Administrative costs for any of the approved purposes on this list.

Exhibit B

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Adams County	Adams	County	
Arvada	Adams	City	2 counties
Aurora	Adams	City	3 counties
Bennett	Adams	City	2 counties
Brighton	Adams	City	2 counties
Commerce City	Adams	City	
Federal Heights	Adams	City	
Lochbuie	Adams	City	2 counties
Northglenn	Adams	City	2 counties
Thornton	Adams	City	2 counties
Westminster	Adams	City	2 counties
Alamosa County	Alamosa	County	
Alamosa	Alamosa	City	
Hooper	Alamosa	City	
Arapahoe County	Arapahoe	County	
Aurora	Arapahoe	City	3 counties
Bennett	Arapahoe	City	2 counties
Bow Mar	Arapahoe	City	2 counties
Centennial	Arapahoe	City	
Cherry Hills Village	Arapahoe	City	
Columbine Valley	Arapahoe	City	
Deer Trail	Arapahoe	City	
Englewood	Arapahoe	City	
Foxfield	Arapahoe	City	
Glendale	Arapahoe	City	
Greenwood Village	Arapahoe	City	
Littleton	Arapahoe	City	3 counties
Sheridan	Arapahoe	City	
Archuleta County	Archuleta	County	
Pagosa Springs	Archuleta	City	
Baca County	Baca	County	
Campo	Baca	City	
Pritchett	Baca	City	
Springfield	Baca	City	
Two Buttes	Baca	City	
Vilas	Baca	City	
Walsh	Baca	City	
Bent County	Bent	County	
Las Animas	Bent	City	
Boulder County	Boulder	County	
Boulder	Boulder	City	
Erie	Boulder	City	2 counties
Jamestown	Boulder	City	
Lafayette	Boulder	City	

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Longmont	Boulder	City	2 counties
Louisville	Boulder	City	
Lyons	Boulder	City	
Nederland	Boulder	City	
Superior	Boulder	City	2 counties
Ward	Boulder	City	
Broomfield	Broomfield	City/County	
Chaffee County	Chaffee	County	
Buena Vista	Chaffee	City	
Poncha Springs	Chaffee	City	
Salida	Chaffee	City	
Cheyenne County	Cheyenne	County	
Cheyenne Wells	Cheyenne	City	
Kit Carson	Cheyenne	City	
Clear Creek County	Clear Creek	County	
Central City	Clear Creek	City	2 counties
Empire	Clear Creek	City	
Georgetown	Clear Creek	City	
Idaho Springs	Clear Creek	City	
Silver Plume	Clear Creek	City	
Conejos County	Conejos	County	
Antonito	Conejos	City	
La Jara	Conejos	City	
Manassa	Conejos	City	
Romeo	Conejos	City	
Sanford	Conejos	City	
Costilla County	Costilla	County	
Blanca	Costilla	City	
San Luis	Costilla	City	
Crowley County	Crowley	County	
Crowley	Crowley	City	
Olney Springs	Crowley	City	
Ordway	Crowley	City	
Sugar City	Crowley	City	
Custer County	Custer	County	
Silver Cliff	Custer	City	
Westcliffe	Custer	City	
Delta County	Delta	County	
Cedaredge	Delta	City	
Crawford	Delta	City	
Delta	Delta	City	
Hotchkiss	Delta	City	
Orchard City	Delta	City	
Paonia	Delta	City	

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Denver	Denver	City/County	
Dolores County	Dolores	County	
Dove Creek	Dolores	City	
Rico	Dolores	City	
Douglas County	Douglas	County	
Aurora	Douglas	City	3 counties
Castle Pines	Douglas	City	
Castle Rock	Douglas	City	
Larkspur	Douglas	City	
Littleton	Douglas	City	3 counties
Lone Tree	Douglas	City	
Parker	Douglas	City	
Eagle County	Eagle	County	
Avon	Eagle	City	
Basalt	Eagle	City	2 counties
Eagle	Eagle	City	
Gypsum	Eagle	City	
Minturn	Eagle	City	
Red Cliff	Eagle	City	
Vail	Eagle	City	
El Paso County	El Paso	County	
Calhan	El Paso	City	
Colorado Springs	El Paso	City	
Fountain	El Paso	City	
Green Mountain Falls	El Paso	City	2 counties
Manitou Springs	El Paso	City	
Monument	El Paso	City	
Palmer Lake	El Paso	City	
Ramah	El Paso	City	
Elbert County	Elbert	County	
Elizabeth	Elbert	City	
Kiowa	Elbert	City	
Simla	Elbert	City	
Fremont County	Fremont	County	
Brookside	Fremont	City	
Cañon City	Fremont	City	
Coal Creek	Fremont	City	
Florence	Fremont	City	
Rockvale	Fremont	City	
Williamsburg	Fremont	City	
Garfield County	Garfield	County	
Carbondale	Garfield	City	
Glenwood Springs	Garfield	City	
New Castle	Garfield	City	

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Parachute	Garfield	City	
Rifle	Garfield	City	
Silt	Garfield	City	
Gilpin County	Gilpin	County	
Black Hawk	Gilpin	City	
Central City	Gilpin	City	2 counties
Grand County	Grand	County	
Fraser	Grand	City	
Granby	Grand	City	
Grand Lake	Grand	City	
Hot Sulphur Springs	Grand	City	
Kremmling	Grand	City	
Winter Park	Grand	City	
Gunnison County	Gunnison	County	
Crested Butte	Gunnison	City	
Gunnison	Gunnison	City	
Marble	Gunnison	City	
Mount Crested Butte	Gunnison	City	
Pitkin	Gunnison	City	
Hinsdale County	Hinsdale	County	
Lake City	Hinsdale	City	
Huerfano County	Huerfano	County	
La Veta	Huerfano	City	
Walsenburg	Huerfano	City	
Jackson County	Jackson	County	
Walden	Jackson	City	
Jefferson County	Jefferson	County	
Arvada	Jefferson	City	2 counties
Bow Mar	Jefferson	City	2 counties
Edgewater	Jefferson	City	
Golden	Jefferson	City	
Lakeside	Jefferson	City	
Lakewood	Jefferson	City	
Littleton	Jefferson	City	3 counties
Morrison	Jefferson	City	
Mountain View	Jefferson	City	
Superior	Jefferson	City	2 counties
Westminster	Jefferson	City	2 counties
Wheat Ridge	Jefferson	City	
Kiowa County	Kiowa	County	
Eads	Kiowa	City	
Haswell	Kiowa	City	
Sheridan Lake	Kiowa	City	
Kit Carson County	Kit Carson	County	

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Bethune	Kit Carson	City	
Burlington	Kit Carson	City	
Flagler	Kit Carson	City	
Seibert	Kit Carson	City	
Stratton	Kit Carson	City	
Vona	Kit Carson	City	
La Plata County	La Plata	County	
Bayfield	La Plata	City	
Durango	La Plata	City	
Ignacio	La Plata	City	
Lake County	Lake	County	
Leadville	Lake	City	
Larimer County	Larimer	County	
Berthoud	Larimer	City	2 counties
Estes Park	Larimer	City	
Fort Collins	Larimer	City	
Johnstown	Larimer	City	2 counties
Loveland	Larimer	City	
Timnath	Larimer	City	2 counties
Wellington	Larimer	City	
Windsor	Larimer	City	2 counties
Las Animas County	Las Animas	County	
Aguilar	Las Animas	City	
Branson	Las Animas	City	
Cokedale	Las Animas	City	
Kim	Las Animas	City	
Starkville	Las Animas	City	
Trinidad	Las Animas	City	
Lincoln County	Lincoln	County	
Arriba	Lincoln	City	
Genoa	Lincoln	City	
Hugo	Lincoln	City	
Limon	Lincoln	City	
Logan County	Logan	County	
Crook	Logan	City	
Fleming	Logan	City	
Iliff	Logan	City	
Merino	Logan	City	
Peetz	Logan	City	
Sterling	Logan	City	
Mesa County	Mesa	County	
Collbran	Mesa	City	
De Beque	Mesa	City	
Fruita	Mesa	City	

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Grand Junction	Mesa	City	
Palisade	Mesa	City	
Mineral County	Mineral	County	
City of Creede	Mineral	City	
Moffat County	Moffat	County	
Craig	Moffat	City	
Dinosaur	Moffat	City	
Montezuma County	Montezuma	County	
Cortez	Montezuma	City	
Dolores	Montezuma	City	
Mancos	Montezuma	City	
Montrose County	Montrose	County	
Montrose	Montrose	City	
Naturita	Montrose	City	
Nucla	Montrose	City	
Olathe	Montrose	City	
Morgan County	Morgan	County	
Brush	Morgan	City	
Fort Morgan	Morgan	City	
Hillrose	Morgan	City	
Log Lane Village	Morgan	City	
Wiggins	Morgan	City	
Otero County	Otero	County	
Cheraw	Otero	City	
Fowler	Otero	City	
La Junta	Otero	City	
Manzanola	Otero	City	
Rocky Ford	Otero	City	
Swink	Otero	City	
Ouray County	Ouray	County	
Ouray	Ouray	City	
Ridgway	Ouray	City	
Park County	Park	County	
Alma	Park	City	
Fairplay	Park	City	
Phillips County	Phillips	County	
Haxtun	Phillips	City	
Holyoke	Phillips	City	
Paoli	Phillips	City	
Pitkin County	Pitkin	County	
Aspen	Pitkin	City	
Basalt	Pitkin	City	2 counties
Snowmass Village	Pitkin	City	
Prowers County	Prowers	County	

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Granada	Prowers	City	
Hartman	Prowers	City	
Holly	Prowers	City	
Lamar	Prowers	City	
Wiley	Prowers	City	
Pueblo County	Pueblo	County	
Boone	Pueblo	City	
Pueblo	Pueblo	City	
Rye	Pueblo	City	
Rio Blanco County	Rio Blanco	County	
Meeker	Rio Blanco	City	
Rangely	Rio Blanco	City	
Rio Grande County	Rio Grande	County	
Center	Rio Grande	City	2 counties
Del Norte	Rio Grande	City	
Monte Vista	Rio Grande	City	
South Fork	Rio Grande	City	
Routt County	Routt	County	
Hayden	Routt	City	
Oak Creek	Routt	City	
Steamboat Springs	Routt	City	
Yampa	Routt	City	
Saguache County	Saguache	County	
Bonanza	Saguache	City	
Center	Saguache	City	2 counties
Crestone	Saguache	City	
Moffat	Saguache	City	
Saguache	Saguache	City	
San Juan County	San Juan	County	
Silverton	San Juan	City	
San Miguel County	San Miguel	County	
Mountain Village	San Miguel	City	
Norwood	San Miguel	City	
Ophir	San Miguel	City	
Sawpit	San Miguel	City	
Telluride	San Miguel	City	
Sedgwick County	Sedgwick	County	
Julesburg	Sedgwick	City	
Ovid	Sedgwick	City	
Sedgwick	Sedgwick	City	
Summit County	Summit	County	
Blue River	Summit	City	
Breckenridge	Summit	City	
Dillon	Summit	City	

Colorado Local Governments*

Government Name	County	Gov't Type	Multi-County
Frisco	Summit	City	
Montezuma	Summit	City	
Silverthorne	Summit	City	
Teller County	Teller	County	
Cripple Creek	Teller	City	
Green Mountain Falls	Teller	City	2 counties
Victor	Teller	City	
Woodland Park	Teller	City	
Washington County	Washington	County	
Akron	Washington	City	
Otis	Washington	City	
Weld County	Weld	County	
Ault	Weld	City	
Berthoud	Weld	City	2 counties
Brighton	Weld	City	2 counties
Dacono	Weld	City	
Eaton	Weld	City	
Erie	Weld	City	2 counties
Evans	Weld	City	
Firestone	Weld	City	
Fort Lupton	Weld	City	
Frederick	Weld	City	
Garden City	Weld	City	
Gilcrest	Weld	City	
Greeley	Weld	City	
Grover	Weld	City	
Hudson	Weld	City	
Johnstown	Weld	City	2 counties
Keenesburg	Weld	City	
Kersey	Weld	City	
La Salle	Weld	City	
Lochbuie	Weld	City	2 counties
Longmont	Weld	City	2 counties
Mead	Weld	City	
Milliken	Weld	City	
Northglenn	Weld	City	2 counties
Nunn	Weld	City	
Pierce	Weld	City	
Platteville	Weld	City	
Raymer (New Raymer)	Weld	City	
Severance	Weld	City	
Thornton	Weld	City	2 counties
Timnath	Weld	City	2 counties
Windsor	Weld	City	2 counties

Colorado Local Governments*

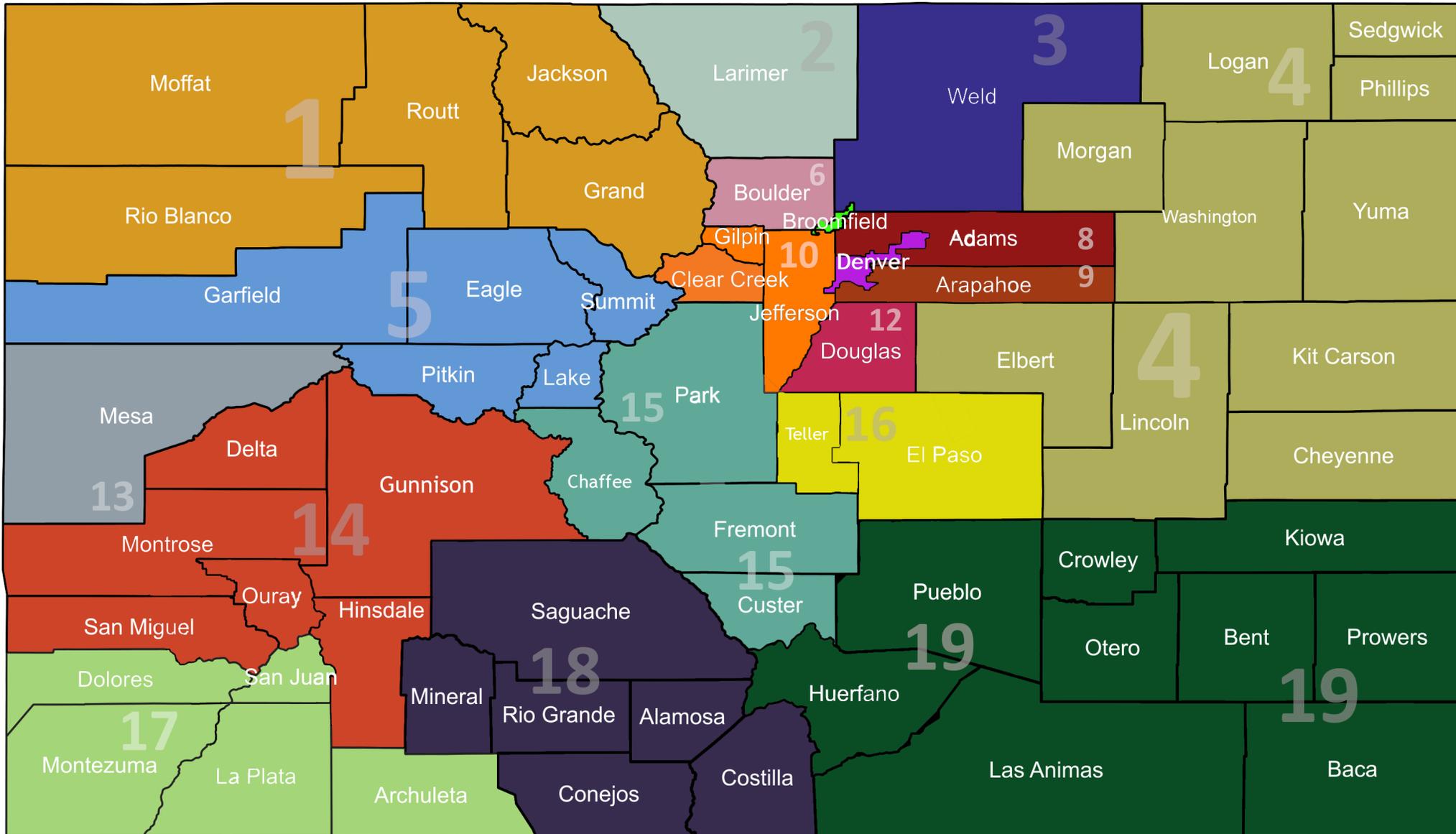
Government Name	County	Gov't Type	Multi-County
Yuma County	Yuma	County	
Eckley	Yuma	City	
Wray	Yuma	City	
Yuma	Yuma	City	

*This list includes all 64 Colorado counties and all 271 municipalities listed in the 2019 Census. Cities located in multiple counties are listed under each corresponding county subheading. City and County of Denver and City and County of Broomfield are counted in both the city and county totals. The City of Carbonate is not included in this list, as there was no population in the 2019 Census data.

This list will be reconciled as necessary to be consistent with the terms of Settlement(s) with Opioid Settling Defendant(s)

Exhibit C

Regions for the distribution of opioid settlement funds



Region 1	Region 5	Region 9	Region 13	Region 17
Region 2	Region 6	Region 10	Region 14	Region 18
Region 3	Region 7 (Broomfield)	Region 11 (Denver)	Region 15	Region 19
Region 4	Region 8	Region 12	Region 16	

Exhibit D

Exhibit D - Allocations to Colorado County Areas

County	Percentage of LG Share
Adams	9.4247%
Alamosa	0.5081%
Arapahoe	10.8071%
Archuleta	0.1370%
Baca	0.0592%
Bent	0.1133%
Boulder	5.7936%
Broomfield	1.0014%
Chaffee	0.3604%
Cheyenne	0.0159%
Clear Creek	0.1380%
Conejos	0.2108%
Costilla	0.0552%
Crowley	0.0934%
Custer	0.0412%
Delta	0.5440%
Denver	15.0042%
Dolores	0.0352%
Douglas	3.6696%
Eagle	0.6187%
El Paso	11.9897%
Elbert	0.2804%
Fremont	0.9937%
Garfield	0.8376%
Gilpin	0.0561%
Grand	0.2037%
Gunnison	0.1913%
Hinsdale	0.0112%
Huerfano	0.2505%
Jackson	0.0310%
Jefferson	10.5173%
Kiowa	0.0142%
Kit Carson	0.0940%
La Plata	0.8127%
Lake	0.0990%
Larimer	6.5211%
Las Animas	0.6304%
Lincoln	0.0819%
Logan	0.3815%
Mesa	2.8911%
Mineral	0.0039%
Moffat	0.2326%
Montezuma	0.4429%

Montrose	0.5695%
Morgan	0.4677%
Otero	0.4486%
Ouray	0.0535%
Park	0.1674%
Phillips	0.0714%
Pitkin	0.1747%
Prowers	0.1727%
Pueblo	5.6757%
Rio Blanco	0.1013%
Rio Grande	0.2526%
Routt	0.3837%
Saguache	0.0666%
San Juan	0.0097%
San Miguel	0.1005%
Sedgwick	0.0618%
Summit	0.3761%
Teller	0.6219%
Washington	0.0357%
Weld	3.8908%
Yuma	0.0992%
TOTAL	100.0000%

Exhibit E

Exhibit E - Intracounty Allocations^{1,2}

The below chart depicts the default percentage that each Local Government will receive from the LG Share amount attributed to its County Area, as described in Section (E)(3) of the MOU. The chart assumes full participation by all Local Governments

Government Name	Intracounty Share
Adams County	68.3372%
Arvada (2 Counties)	0.2632%
Aurora (3 Counties)	4.6336%
Bennett (2 Counties)	0.1670%
Brighton (2 Counties)	1.4527%
Commerce City	4.7314%
Federal Heights	1.1457%
Lochbuie (2 Counties)	0.0001%
Northglenn (2 Counties)	2.0913%
Thornton (2 Counties)	10.6435%
Westminster (2 Counties)	6.5342%

Alamosa County	85.3075%
Alamosa	14.6818%
Hooper	0.0108%

Arapahoe County	42.7003%
Aurora (3 Counties)	35.5997%
Bennett (2 Counties)	0.0324%
Bow Mar (2 Counties)	0.0159%
Centennial	0.4411%
Cherry Hills Village	0.6685%
Columbine Valley	0.1601%
Deer Trail	0.0003%
Englewood	5.5850%
Foxfield	0.0372%
Glendale	1.2289%
Greenwood Village	2.8305%
Littleton (3 Counties)	8.5654%
Sheridan	2.1347%

Archuleta County	90.0864%
Pagosa Springs	9.9136%

Baca County	85.9800%
Campo	2.4443%
Pritchett	1.5680%
Springfield	7.0100%

Government Name	Intracounty Share
Two Buttes	0.4766%
Vilas	0.9070%
Walsh	1.6141%

Bent County	80.9608%
Las Animas	19.0392%

Boulder County	47.6311%
Boulder	31.7629%
Erie (2 Counties)	0.3634%
Jamestown	0.0086%
Lafayette	3.3203%
Longmont (2 Counties)	14.6833%
Louisville	1.4455%
Lyons	0.5916%
Nederland	0.1646%
Superior (2 Counties)	0.0258%
Ward	0.0030%

Broomfield County/City	100.0000%
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Chaffee County	74.8440%
Buena Vista	5.8841%
Poncha Springs	4.2369%
Salida	15.0350%

Cheyenne County	66.8002%
Cheyenne Wells	0.8586%
Kit Carson	32.3412%

Clear Creek County	92.2164%
Central City (2 Counties)	0.0000%
Empire	0.3364%
Georgetown	1.9063%
Idaho Springs	4.7625%
Silver Plume	0.7784%

Conejos County	77.1204%
Antonito	4.6338%
La Jara	2.4313%
Manassa	1.0062%
Romeo	2.4270%
Sanford	12.3812%

Government Name	Intracounty Share
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Costilla County	97.3454%
Blanca	1.2036%
San Luis	1.4509%

Crowley County	80.7081%
Crowley	4.3597%
Olney Springs	8.3683%
Ordway	0.1853%
Sugar City	6.3786%

Custer County	96.6858%
Silver Cliff	0.7954%
Westcliffe	2.5188%

Delta County	76.3512%
Cedaredge	3.6221%
Crawford	0.4938%
Delta	16.2658%
Hotchkiss	1.0963%
Orchard City	0.1473%
Paonia	2.0236%

Denver County/City	100.0000%
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Dolores County	76.3307%
Dove Creek	17.3127%
Rico	6.3566%

Douglas County	71.8404%
Aurora (3 Counties)	0.2099%
Castle Pines	0.2007%
Castle Rock	13.5204%
Larkspur	0.0856%
Littleton (3 Counties)	0.0156%
Lone Tree	5.2786%
Parker	8.8487%

Eagle County	60.8236%
Avon	7.6631%
Basalt (2 Counties)	2.2311%
Eagle	3.1376%
Gypsum	1.7469%
Minturn	0.7771%

Government Name	Intracounty Share
Red Cliff	0.0957%
Vail	23.5250%

El Paso County	18.4181%
Calhan	0.0228%
Colorado Springs	80.1161%
Fountain	0.9892%
Green Mountain Falls (2 Counties)	0.0149%
Manitou Springs	0.2411%
Monument	0.1492%
Palmer Lake	0.0455%
Ramah	0.0033%

Elbert County	86.5840%
Elizabeth	10.2633%
Kiowa	1.5455%
Simla	1.6072%

Fremont County	60.7882%
Brookside	0.0348%
Cañon City	30.9017%
Coal Creek	0.0476%
Florence	8.0681%
Rockvale	0.0687%
Williamsburg	0.0907%

Garfield County	76.3371%
Carbondale	2.4698%
Glenwood Springs	11.8141%
New Castle	1.4295%
Parachute	1.0653%
Rifle	5.2733%
Silt	1.6110%

Gilpin County	46.8613%
Black Hawk	46.3909%
Central City (2 Counties)	6.7478%

Grand County	80.1046%
Fraser	2.4903%
Granby	5.4008%
Grand Lake	0.3174%
Hot Sulphur Springs	0.1431%
Kremmling	2.9284%

Government Name	Intracounty Share
Winter Park	8.6154%

Gunnison County	88.9185%
Crested Butte	2.3562%
Gunnison	5.9501%
Marble	0.1714%
Mount Crested Butte	2.5657%
Pitkin	0.0381%

Hinsdale County	76.0940%
Lake City	23.9060%

Huerfano County	68.2709%
La Veta	11.0719%
Walsenburg	20.6572%

Jackson County	61.5339%
Walden	38.4661%

Jefferson County	58.2140%
Arvada (2 Counties)	11.9733%
Bow Mar (2 Counties)	0.0087%
Edgewater	0.6604%
Golden	3.4815%
Lakeside	0.0030%
Lakewood	15.9399%
Littleton (3 Counties)	0.6176%
Morrison	0.2205%
Mountain View	0.1344%
Superior (2 Counties)	0.0000%
Westminster (2 Counties)	5.4779%
Wheat Ridge	3.2689%

Kiowa County	93.2138%
Eads	5.3777%
Haswell	0.6402%
Sheridan Lake	0.7682%

Kit Carson County	86.3178%
Bethune	0.1841%
Burlington	12.0640%
Flagler	0.4264%
Seibert	0.0291%
Stratton	0.9012%

Government Name	Intracounty Share
Vona	0.0775%

La Plata County	66.8874%
Bayfield	1.6292%
Durango	29.2985%
Ignacio	2.1849%

Lake County	73.4523%
Leadville	26.5477%

Larimer County	56.0589%
Berthoud (2 Counties)	0.4139%
Estes Park	0.3502%
Fort Collins	18.5702%
Johnstown (2 Counties)	0.0711%
Loveland	23.4493%
Timnath (2 Counties)	0.2964%
Wellington	0.3653%
Windsor (2 Counties)	0.4248%

Las Animas County	77.8076%
Aguilar	0.0751%
Branson	0.0101%
Cokedale	0.0188%
Kim	0.0101%
Starkville	0.0087%
Trinidad	22.0696%

Lincoln County	91.3222%
Arriba	0.3444%
Genoa	0.2222%
Hugo	1.4778%
Limon	6.6333%

Logan County	72.7982%
Crook	0.0931%
Fleming	0.3413%
Iliff	0.0095%
Merino	0.4702%
Peetz	0.2029%
Sterling	26.0848%

Mesa County	60.8549%
Collbran	0.0920%

Government Name	Intracounty Share
De Beque	0.0123%
Fruita	1.6696%
Grand Junction	37.1505%
Palisade	0.2208%

Mineral County	87.6744%
City of Creede	12.3256%

Moffat County	91.7981%
Craig	8.1862%
Dinosaur	0.0157%

Montezuma County	79.6682%
Cortez	18.6459%
Dolores	0.6106%
Mancos	1.0753%

Montrose County	92.8648%
Montrose	6.5980%
Naturita	0.1551%
Nucla	0.0703%
Olathe	0.3118%

Morgan County	61.6991%
Brush	8.5522%
Fort Morgan	27.8214%
Hillrose	0.1986%
Log Lane Village	0.6424%
Wiggins	1.0863%

Otero County	60.8168%
Cheraw	0.1888%
Fowler	1.0413%
La Junta	25.9225%
Manzanola	0.6983%
Rocky Ford	8.8215%
Swink	2.5109%

Ouray County	76.0810%
Ouray	17.6541%
Ridgway	6.2649%

Park County	96.3983%
Alma	0.7780%

Government Name	Intracounty Share
Fairplay	2.8237%

Phillips County	52.3463%
Haxtun	13.9505%
Holyoke	33.1803%
Paoli	0.5228%

Pitkin County	47.1379%
Aspen	42.0707%
Basalt (2 Counties)	1.1156%
Snowmass Village	9.6757%

Prowers County	70.4524%
Granada	0.9965%
Hartman	0.3164%
Holly	4.9826%
Lamar	21.5860%
Wiley	1.6661%

Pueblo County	54.6622%
Boone	0.0019%
Pueblo	45.3350%
Rye	0.0008%

Rio Blanco County	78.2831%
Meeker	9.1326%
Rangely	12.5843%

Rio Grande County	68.0724%
Center (2 Counties)	0.7713%
Del Norte	6.7762%
Monte Vista	20.4513%
South Fork	3.9288%

Routt County	58.5353%
Hayden	1.0679%
Oak Creek	0.6360%
Steamboat Springs	39.4499%
Yampa	0.3109%

Saguache County	92.8796%
Bonanza	0.1367%
Center (2 Counties)	6.3687%
Crestone	0.0137%

Government Name	Intracounty Share
Moffat	0.3553%
Saguache	0.2460%

San Juan County	87.0423%
Silverton	12.9577%

San Miguel County	48.7493%
Mountain Village	25.7930%
Norwood	0.4078%
Ophir	0.0816%
Sawpit	0.0272%
Telluride	24.9411%

Sedgwick County	98.7331%
Julesburg	0.3830%
Ovid	0.0295%
Sedgwick	0.8544%

Summit County	57.0567%
Blue River	0.5011%
Breckenridge	26.1112%
Dillon	4.1421%
Frisco	6.5096%
Montezuma	0.0169%
Silverthorne	5.6623%

Teller County	66.1557%
Cripple Creek	17.2992%
Green Mountain Falls (2 Counties)	0.0322%
Victor	3.1685%
Woodland Park	13.3445%

Washington County	99.1320%
Akron	0.7659%
Otis	0.1021%

Weld County	51.9387%
Ault	0.3202%
Berthoud (2 Counties)	0.0061%
Brighton (2 Counties)	0.0927%
Dacono	0.6104%
Eaton	0.4573%
Erie (2 Counties)	0.8591%
Evans	4.5121%

Government Name	Intracounty Share
Firestone	1.4648%
Fort Lupton	0.8502%
Frederick	1.2228%
Garden City	0.1514%
Gilcrest	0.1580%
Greeley	30.6922%
Grover	0.0852%
Hudson	0.0066%
Johnstown (2 Counties)	1.5416%
Keenesburg	0.0215%
Kersey	0.1378%
La Salle	0.4128%
Lochbuie (2 Counties)	0.4004%
Longmont (2 Counties)	0.0154%
Mead	0.0941%
Milliken	1.5373%
Northglenn (2 Counties)	0.0030%
Nunn	0.2558%
Pierce	0.0948%
Platteville	0.3712%
Raymer (New Raymer)	0.0597%
Severance	0.0403%
Thornton (2 Counties)	0.0000%
Timnath (2 Counties)	0.0000%
Windsor (2 Counties)	1.5865%

Yuma County	75.5598%
Eckley	2.5422%
Wray	10.2148%
Yuma	11.6832%

¹These allocations are based on the allocation model used in the Negotiation Class website. The allocation model is the product of prolonged and intensive research, analysis, and discussion by and among members of the court-appointed Plaintiffs' Executive Committee and Settlement Committee and their retained public health and health economics experts, as well as a series of meetings with scores of cities, counties and subdivisions. Additional information about the allocation model is available on the Negotiation Class website.

The allocations in the Negotiation Class website use two different methodologies:

County-Level Allocation

The allocation model uses three factors, based on reliable, detailed, and objective data collected and reported by the federal government, to determine the share of a settlement fund that each county will receive. The three factors are: (1) the amount of opioids shipped to the county, (2) the number of opioid deaths in that county, and (3) the number of people who suffer opioid use disorder in that county.

County/Municipal-Level Allocation

The county/municipal-level allocation is a default allocation to be used if another agreement is not reached between the county and its constituent cities. The formula uses U.S. Census Bureau data on local government spending. This data covers cities and counties for 98% of the U.S. population. If a jurisdiction lacked this data, it was extrapolated based on available data.

²The municipalities of Bow Mar, Johnstown, and Timnath were not reflected as being in multiple counties in the Negotiation Class website. The estimated allocations to those cities are based on the same methodology used in the website, in consultation with the expert. For cities in multiple counties, please see each county in which that city lies.

Exhibit F

Regional Allocations		
Region Number	Region Description	Total State Share
1	Northwest	0.9522%
2	Larimer	6.5211%
3	Weld	3.8908%
4	Logan	1.5896%
5	North Central	2.1061%
6	Boulder	5.7936%
7	Broomfield	1.0014%
8	Adams	9.4247%
9	Arapahoe	10.8071%
10	Jefferson	10.7114%
11	Denver	15.0042%
12	Douglas	3.6696%
13	Mesa	2.8911%
14	Southwest	1.4700%
15	Central	1.5627%
16	El Paso/Teller	12.6116%
17	Southwest Corner	1.4375%
18	South Central	1.0973%
19	Southeast	7.4580%
Total		100.0000%

Exhibit G

Regional Governance Models

A. Membership Structure

Single-County Regions

1. Voting Members (Recommended List: Participating Local Governments to Decide)
 - 1 or 2 representatives appointed by the county (can be commissioners)
 - 1 representative appointed from the public health department
 - 1 representative from the county human services department
 - 1 representative appointed from law enforcement within region (sheriff, police, local city or town district attorney, etc.)
 - 1 representative appointed from a municipal or county court system within region
 - 1-3 representatives (total) appointed by the cities within the county (or other city or cities agreed upon) (can be councilmembers and mayors)
 - Such other representatives as participating counties/cities agree on (not to include providers who may be recipients of funds)
2. Non-Voting Members (Optional but strongly encouraged)
 - Representatives from behavioral health providers
 - Representatives from health care providers
 - Recovery/treatment experts
 - Other county or city representatives
 - A representative from the Attorney General's Office
 - Community representative(s), preferably those with lived experience with the opioid crisis
 - Harm reduction experts

Multi-County Regions

1. Voting Members (Recommended List: Participating Local Governments to Decide)
 - 1 representative appointed by each county (can be commissioners)
 - 1 representative appointed by a rotating city within each county (or other city agreed upon) (can be councilmembers and mayors)
 - 1 representative from each public health department within the region
 - 1 representative from a county human services department
 - At least 1 representative appointed from law enforcement within region (sheriff, police, local city or town district attorney, etc.)
 - 1 representative from a municipal or county court system within region
 - Such other representatives as participating counties/cities agree on (not to include providers who may be recipients of funds)
2. Non-Voting Members (Optional)
 - Representatives from behavioral health providers

- Representatives from health care providers
- Recovery/treatment experts
- Other county or city representatives
- A representative from the Attorney General’s Office
- Community representative(s), preferably those with lived experience with the opioid crisis.
- Harm reduction experts

Single-County Single-City Regions (Denver & Broomfield)

1. Voting Members (Recommended List: Participating Local Government to Decide)¹

- 1 representative appointed by the city and county
- 1 representative appointed from the public health department
- 1 representative from the county human services department
- 1 representative appointed from law enforcement within region (sheriff, police, district attorney, etc.)
- 1 representative appointed from a municipal or county court system within region
- Such other representatives as participating counties/cities agree on (not to include providers who may be recipients of funds)

2. Non-Voting Members (Optional)

- Representatives from behavioral health providers
- Representatives from health care providers
- Recovery/treatment experts
- Other county or city representatives
- A representative from the Attorney General’s Office
- Community representative(s), preferably those with lived experience with the opioid crisis.
- Harm reduction experts

B. Member Terms

- Regions may establish terms of appointment for members. Appointment terms may be staggered.

C. Procedures

- Regions will be governed by an intergovernmental agreement (“IGA”) or memorandum of understanding (“MOU”).
- Regions may adopt the Model Colorado Regional Opioid Intergovernmental Agreement, attached here as Exhibit G-1, in its entirety or alter or amend it as they deem appropriate.

¹ In Denver, the Mayor shall make voting member appointments to the Regional Council. In Broomfield, the City and County Manager shall make voting member appointments to the Regional Council.

- Regions may establish their own procedures through adoption of bylaws (model bylaws to be made available).
- Meetings of regional board/committee shall be open to the public and comply with the Colorado Open Meetings Law (including requirement to keep minutes).

D. Financial Responsibility/Controls

- A local government entity shall nominate and designate a fiscal agent for the Region.
- A Regional fiscal agent must be appointed by the Regional Council on an annual basis. A Regional fiscal agent may serve as long as the Regional Council determines is appropriate, including the length of any Settlement that contemplates the distribution of Opioid Funds within Colorado. However, the Regional fiscal agent also can change over time.
- Regional fiscal agents must be a board of county commissioners or a city or town council or executive department, such as a department of finance.
- Yearly reporting by fiscal agent (using standard form) to the Abatement Council.
- All documents subject to CORA.

E. Conflicts of Interest

- Voting members shall abide by the conflict-of-interest rules applicable to local government officials under state law.

F. Ethics Laws

- Voting members shall abide by applicable state or local ethics laws, as appropriate.

G. Authority

- The Regional Council for each region shall have authority to decide how funds allocated to the region shall be distributed in accordance with the Colorado MOU and shall direct the fiscal agent accordingly.
- Any necessary contracts will be entered into by the fiscal agent, subject to approval by the Regional Council.

H. Legal Status

- The region shall not be considered a separate legal entity, unless the Participating Local Governments decide, through an IGA, to create a separate governmental entity.

Exhibit G-1

MODEL COLORADO REGIONAL OPIOID
INTERGOVERNMENTAL AGREEMENT²

THIS MODEL COLORADO REGIONAL OPIOID INTERGOVERNMENTAL AGREEMENT (the “Regional Agreement”) is made between _____, a Participating Local Government, as defined in the Colorado MOU, in the _____ Region (“_____”) and _____, a Participating Local Government in the _____ Region, (“_____”), individually herein a “Regional PLG” and collectively the “Regional PLGs.””

RECITALS

WHEREAS, the State of Colorado and Participating Local Governments executed the Colorado Opioids Summary Memorandum of Understanding on _____ 2021 (the “Colorado MOU”), establishing the manner in which Opioid Funds shall be divided and distributed within the State of Colorado;

WHEREAS, the Regional Agreement assumes and incorporates the definitions and provisions contained in the Colorado MOU, and the Regional Agreement shall be construed in conformity with the Colorado MOU³;

WHEREAS, all Opioid Funds, regardless of allocation, shall be used for Approved Purposes;

WHEREAS, Participating Local Governments shall organize themselves into Regions, as further depicted in **Exhibit E** to the Colorado MOU;

² This Model Regional Agreement is meant to serve as an example for the various Regions and to facilitate the flow of Opioid Funds to their intended purposes. Regions are free to adopt this Regional Agreement in its entirety or alter or amend it as they deem appropriate.

³ When drafting agreements like this Regional Agreement, Regional PLGs should be conscious of the definitions used therein so as not to confuse such definitions with those used in the Colorado MOU. The Definitions in the Colorado MOU shall supersede any definitions used by Regional PLGs in a Regional Agreement.

WHEREAS, Regions may consist of Single-County Regions, Multi-County Regions, or Single County-Single City Regions (Denver and Broomfield).

WHEREAS, there shall be a 60% direct allocation of Opioid Funds to Regions through a Regional Share;

WHEREAS, each Region shall be eligible to receive a Regional Share according to **Exhibit C** to the Colorado MOU;

WHEREAS, the Colorado MOU establishes the procedures by which each Region shall be entitled to Opioid Funds from the Abatement Council and administer its Regional Share allocation;

WHEREAS, the procedures established by the Colorado MOU include a requirement that each Region shall create its own Regional Council;

WHEREAS, all aspects of the creation, administration, and operation of the Regional Council shall proceed in accordance with the provisions of the Colorado MOU;

WHEREAS, each such Regional Council shall designate a fiscal agent from a county or municipal government within that Region;

WHEREAS, each such Regional Council shall submit a two-year plan to the Abatement Council that identifies the Approved Purposes for which the requested funds will be used, and the Regional Council's fiscal agent shall provide data and a certification to the Abatement Council regarding compliance with its two-year plan on an annual basis;

WHEREAS, the Regional Agreement pertains to the procedures for the Regional PLGs to establish a Regional Council, designate a fiscal agent, and request and administer Opioid Funds in a manner consistent with the Colorado MOU;

NOW, THEREFORE, in consideration of the mutual covenants and agreements hereinafter set forth and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Regional PLGs incorporate the recitals set forth above and agree as follows:

1. **DEFINITIONS**. The defined terms used in this Regional Agreement shall have the same meanings as in the Colorado MOU⁴. Capitalized terms used herein and not otherwise defined within the Regional Agreement or in the Colorado MOU shall have the meanings ascribed to them in the body of the Regional Agreement.
2. **OBLIGATIONS OF THE REGIONAL PLGS**. The Regional PLGs shall perform their respective obligations as set forth in the Regional Agreement, the Colorado MOU and the accompanying exhibits to the Colorado MOU and incorporated herein by reference.
3. **REGIONAL COUNCIL**.
 - 3.1. **Purpose:** In accordance with the Colorado MOU, a Regional Council, consisting of representatives appointed by the Regional PLGs, shall be created to oversee the procedures by which a Region may request Opioid Funds from the Abatement Council and the procedures by which the allocation of its Region's Share of Opioid Funds are administered.
 - 3.2. **Membership:** The Regional Council of a Multi-County or Single County Region shall consist of the following:
 - a. **Multi-County Region:**
 - (i) **Voting Members.** Voting Members shall be appointed by the Regional PLGs. The Regional PLGs shall collaborate to appoint Regional Council members and to the extent practicable, Voting Members shall be selected from different counties and cities. No single county or city should dominate the make-up of the Regional Council. Voting Members shall be selected as follows:
 - (1) 1 representative appointed by each county (can be commissioners).
 - (2) 1 representative appointed from a rotating city within each county (or other city agreed upon) (can be councilmembers and mayors). A rotating city member shall be selected by majority vote of the cities within each county who do not have a Voting Member currently sitting on the Regional

⁴ See FN 2, *supra*.

Council.

- (3) 1 representative from each public health department within the region.
- (4) 1 representative from a county human services department.
- (5) At least 1 representative appointed from law enforcement within the region (sheriff, police, local city or town district attorney, etc.).
- (6) 1 representative from a municipal or county court system within the region.

b. Single-County Region:

- (i) **Voting Members.** Voting Members shall be appointed by the Regional PLGs. The Regional PLGs shall collaborate to appoint Regional Council members and to the extent practicable, Voting Members shall be selected from different cities within the region. No single city should dominate the make-up of the Regional Council. Voting Members shall be selected as follows:
 - (1) 1 or 2 representatives appointed by the county (can be commissioners)
 - (2) 1 representative appointed from the public health department
 - (3) 1 representative from the county human services department
 - (4) 1 representative appointed from law enforcement within region (sheriff, police, local city or town district attorney, etc.)
 - (5) 1 representative appointed from a municipal or county court system within region
 - (6) 1-3 representatives (total) appointed by rotating cities within the county (or other city or cities agreed upon) (can be councilmembers and mayors). Rotating city members shall be selected by majority vote of the cities who do not have a Voting Member currently sitting on the Regional Council.
 - (7) Such other representatives as participating counties/cities agree on (not to include providers who may be recipients of

funds)

- c. **Non-Voting Members.** For both Multi-County and Single County Regions, Non-Voting Members are optional but are strongly encouraged. Non-voting members shall serve in an advisory capacity. Any Non-Voting Members shall be appointed by the Regional PLGs and may be comprised of all or some of the following, not to include potential recipients of funds:
 - (i) Representatives from behavioral health providers.
 - (ii) Representatives from health care providers.
 - (iii) Recovery/treatment experts.
 - (iv) Other county or city representatives.
 - (v) A representative from the Attorney General's Office.
 - (vi) Community representative(s), preferably those with lived experience with the opioid crisis.
 - (vii) Harm reduction experts.
- d. **Acting Chair:** The Voting Members for both Multi-County and Single-County Regions shall appoint one member to serve as Acting Chair of the Regional Council. The Acting Chair's primary responsibilities shall be to schedule periodic meetings and votes of the Regional Council as needed and to serve as the point of contact for disputes within the Region. The Acting Chair must be either a Member from a county within a Region, such as a county commissioner or their designee, or a Member from a city or town within a Region, such as a mayor or city or town council member or their designee.
- e. **Non-Participation:** A Local Government that chooses not to become a Participating Local Government in the Colorado MOU shall not receive any Opioid Funds from the Regional Share or participate in the Regional Council.
- f. **Terms:** The Regional Council shall be established within ninety (90) days of the first Settlement being entered by a court of competent jurisdiction, including any bankruptcy court. In order to do so, within sixty (60) days of the first Settlement being entered, CCI and CML shall jointly recommend six (6) Voting Members, and so long as such recommendations comply with the terms of Section 3.2 (a) or (b), the Regional Council shall consist of CCI/CML's recommended Members for

an initial term not to exceed one year.⁵ Thereafter, Voting Members shall be appointed in accordance with Section 3.2 (a) or (b) and shall serve two-year terms. Following the expiration of that two-year term, the Regional PLGs, working in concert, shall reappoint that Voting Member, or appoint a new Voting Member according to Section 3.2 (a) or (b).

- (i) If a Voting Member resigns or is otherwise removed from the Regional Council prior to the expiration of their term, a replacement Voting Member shall be appointed within sixty (60) days in accordance with Section 3.2 (a) or (b) to serve the remainder of the term. If the Regional PLGs are unable to fill a Voting Member vacancy within sixty (60) days, the existing Voting Members of the Regional Council at the time of the vacancy shall work collectively to appoint a replacement Voting Member in accordance with Section 3.2 (a) or (b). At the end of his or her term, the individual serving as that replacement Voting Member may be reappointed by the Regional PLGs to serve a full term consistent with this Section.
- (ii) The purpose of the two-year term is to allow Regional PLGs an increased opportunity to serve on the Regional Council. However, Regional Council members who have already served on the Regional Council may be appointed more than once and may serve consecutive terms if appointed to do so by the Regional Council.

3.3. Duties: The Regional Council is primarily responsible for engaging with the Abatement Council on behalf of its Region and following the procedures outlined in the Colorado MOU for requesting Opioid Funds from the Regional Share, which shall include developing 2-year plans, amending those plans as appropriate, and providing the Abatement Council with data through its fiscal agent regarding Opioid Fund expenditures. Upon request from the Abatement Council, the Regional Council may also be subject to an accounting from the Abatement Council.

3.4. Governance: A Regional Council may establish its own procedures through adoption of bylaws if needed. Any governing documents must be consistent with the other provisions in this section and the Colorado MOU.

3.5. Authority: The terms of the Colorado MOU control the authority of a Regional Council and a Regional Council shall not stray outside the bounds of the authority and power vested by the Colorado MOU. Should a Regional Council require legal assistance in determining its authority,

⁵ Local Governments within Multi-County or Single County Regions may decide to select initial Voting Members of the Regional Council between themselves and without CCI and CML involvement. However, the Regional Council must be established within ninety (90) days of the first Settlement being entered by a court of competent jurisdiction, including any bankruptcy court.

it may seek guidance from the legal counsel of the county or municipal government of the Regional Council's fiscal agent at the time the issue arises.

3.6. Collaboration: The Regional Council shall facilitate collaboration between the State, Participating Local Governments within its Region, the Abatement Council, and other stakeholders within its Region for the purposes of sharing data, outcomes, strategies, and other relevant information related to abating the opioid crisis in Colorado.

3.7. Transparency: The Regional Council shall operate with all reasonable transparency and abide by all Colorado laws relating to open records and meetings. To the extent the Abatement Council requests outcome-related data from the Regional Council, the Regional Council shall provide such data in an effort to determine best methods for abating the opioid crisis in Colorado.

3.8. Conflicts of Interest: Voting Members shall abide by the conflict-of-interest rules applicable to local government officials under state law.

3.9. Ethics Laws: Voting Members shall abide by their local ethics laws or, if no such ethics laws exist, by applicable state ethics laws.

3.10. Decision Making: The Regional Council shall seek to make all decisions by consensus. In the event consensus cannot be achieved, the Regional Council shall make decisions by a majority vote of its Members.

4. REGIONAL FISCAL AGENT

4.1. Purpose: According to the Colorado MOU, the Regional Council must designate a fiscal agent for the Region prior to the Region receiving any Opioid funds from the Regional Share. All funds from the Regional Share shall be distributed to the Regional Council's fiscal agent for the benefit of the entire Region.

4.2. Designation: The Regional Council shall nominate and designate a fiscal agent for the Region by majority vote. Regional fiscal agents must be a board of county commissioners or a city or town council or executive department, such as a department of finance.

4.3. Term: A Regional fiscal agent must be appointed by the Regional Council on an annual basis. A Regional fiscal agent may serve as long as the Regional Council determines is appropriate, including the length of any Settlement that contemplates the distribution of Opioid Funds within Colorado.

4.4. Duties: The Regional fiscal agent shall receive, deposit, and make available Opioid Funds distributed from the Abatement Council and provide expenditure reporting data to the

Abatement Council on an annual basis. In addition, the Regional fiscal agent shall perform certain recordkeeping duties outlined below.

- a. **Opioid Funds:** The Regional fiscal agent shall receive all Opioid Funds as distributed by the Abatement Council. Upon direction by the Regional Council, the Regional fiscal agent shall make any such Opioid Funds available to the Regional Council.
- b. **Reporting:** On an annual basis, as determined by the Abatement Council, the Regional fiscal agent shall provide to the Abatement Council the Regional Council's expenditure data from their allocation of the Regional Share and certify to the Abatement Council that the Regional Council's expenditures were for Approved Purposes and complied with its 2-year plan.
- c. **Recordkeeping:** The Regional fiscal agent shall maintain necessary records with regard the Regional Council's meetings, decisions, plans, and expenditure data.

4.5. Authority: The fiscal agent serves at the direction of the Regional Council and in service to the entire Region. The terms of the Colorado MOU control the authority of a Regional Council, and by extension, the Regional fiscal agent. A Regional fiscal agent shall not stray outside the bounds of the authority and power vested by the Colorado MOU.

5. REGIONAL TWO-YEAR PLAN

5.1. Purpose: According to the Colorado MOU, as part of a Regional Council's request to the Abatement Council for Opioid Funds from its Regional Share, the Regional Council must submit a 2-year plan identifying the Approved Purposes for which the requested funds will be used.

5.2 Development of 2-Year Plan: In developing a 2-year plan, the Regional Council shall solicit recommendations and information from all Regional PLGs and other stakeholders within its Region for the purposes of sharing data, outcomes, strategies, and other relevant information related to abating the opioid crisis in Colorado. At its discretion, a Regional Council may seek assistance from the Abatement Council for purposes of developing a 2-year plan.

5.3 Amendment: At any point, a Regional Council's 2-year plan may be amended so long as such amendments comply with the terms of the Colorado MOU and any Settlement.

6. DISPUTES WITHIN REGION. In the event that any Regional PLG disagrees with a decision of the Regional Council, or there is a dispute regarding the appointment of Voting or Non-Voting Members to the Regional Council, that Regional PLG shall inform the Acting Chair of its dispute at the earliest

possible opportunity. In Response, the Regional Council shall gather any information necessary to resolve the dispute. Within fourteen (14) days of the Regional PLG informing the Acting Chair of its dispute, the Regional Council shall issue a decision with respect to the dispute. In reaching its decision, the Regional Council may hold a vote of Voting Members, with the Acting Chair serving as the tie-breaker, or the Regional Council may devise its own dispute resolution process. However, in any disputes regarding the appointment of a Voting Member, that Voting Member will be recused from voting on the dispute. The decision of the Regional Council is a final decision.

7. **DISPUTES WITH ABATEMENT COUNCIL.** If the Regional Council disputes the amount of Opioid Funds it receives from its allocation of the Regional Share, the Regional Council shall alert the Abatement Council within sixty (60) days of discovering the information underlying the dispute. However, the failure to alert the Abatement Council within this time frame shall not constitute a waiver of the Regional Council's right to seek recoupment of any deficiency in its Regional Share.
8. **RECORDKEEPING.** The acting Regional fiscal agent shall be responsible for maintaining records consistent with the Regional Agreement.
9. **AUTHORIZED REPRESENTATIVES.** Each Regional PLGs' representative designated below shall be the point of contact to coordinate the obligations as provided herein. The Regional PLGs designate their authorized representatives under this Regional Agreement as follows:
 - 9.1. _____ designates the ____ of the _____ or their designee(s).
 - 9.2. _____ designates the ____ of the _____ or their designee(s).
10. **OBLIGATIONS OF THE REGIONAL PLGS.** The Regional PLGs shall perform their respective obligations as set forth in the Regional Agreement, the Colorado MOU and the accompanying exhibits to the Colorado MOU and incorporated herein by reference.
11. **TERM.** The Regional Agreement will commence on _____, and shall expire on the date the last action is taken by the Region, consistent with the terms of the Colorado MOU and any Settlement. (the "Term").
12. **INFORMATIONAL OBLIGATIONS.** Each Regional PLG hereto will meet its obligations as set forth in § 29-1-205, C.R.S., as amended, to include information about this Regional Agreement in a filing with the Colorado Division of Local Government; however, failure to do so shall in no way affect the validity of this Regional Agreement or any remedies available to the Regional PLGs hereunder.
13. **CONFIDENTIALITY.** The Regional PLGs, for themselves, their agents, employees and representatives, agree that they will not divulge any confidential or proprietary information they receive from another Regional PLG or otherwise have access to, except as may be required by law. Nothing in this Regional

Agreement shall in any way limit the ability of the Regional PLGs to comply with any laws or legal process concerning disclosures by public entities. The Regional PLGs understand that all materials exchanged under this Regional Agreement, including confidential information or proprietary information, may be subject to the Colorado Open Records Act., § 24-72-201, *et seq.*, C.R.S., (the “Act”). In the event of a request to a Regional PLG for disclosure of confidential materials, the Regional PLG shall advise the Regional PLGs of such request in order to give the Regional PLGs the opportunity to object to the disclosure of any of its materials which it marked as, or otherwise asserts is, proprietary or confidential. If a Regional PLG objects to disclosure of any of its material, the Regional PLG shall identify the legal basis under the Act for any right to withhold. In the event of any action or the filing of a lawsuit to compel disclosure, the Regional PLG agrees to intervene in such action or lawsuit to protect and assert its claims of privilege against disclosure of such material or waive the same. If the matter is not resolved, the Regional PLGs may tender all material to the court for judicial determination of the issue of disclosure.

14. GOVERNING LAW; VENUE. This Regional Agreement shall be governed by the laws of the State of Colorado. Venue for any legal action relating solely to this Regional Agreement will be in the applicable District Court of the State of Colorado for the county of the Region’s fiscal agent. Venue for any legal action relating to the Colorado MOU shall be in a court of competent jurisdiction where a Settlement or consent decree was entered, as those terms are described or defined in the Colorado MOU. If a legal action relates to both a Regional Agreement and the Colorado MOU, venue shall also be in a court of competent jurisdiction where a Settlement or consent decree was entered.

15. TERMINATION. The Regional PLGs enter into this Regional Agreement to serve the public interest. If this Regional Agreement ceases to further the public interest, a Regional PLG, in its discretion, may terminate their participation in the Regional Agreement, in whole or in part, upon written notice to the other Regional PLGs. Each Regional PLG also has the right to terminate the Regional Agreement with cause upon written notice effective immediately, and without cause upon thirty (30) days prior written notice to the other Regional PLGs. A Regional PLG’s decision to terminate this Regional Agreement, with or without cause, shall have no impact on the other Regional PLGs present or future administration of its Opioid Funds and the other procedures outlined in this Regional Agreement. Rather, a Regional PLG’s decision to terminate this Regional Agreement shall have the same effect as non-participation, as outlined in Section 3.2 (e).

16. NOTICES. “Key Notices” under this Regional Agreement are notices regarding default, disputes, or termination of the Regional Agreement. Key Notices shall be given in writing and shall be deemed

received if given by confirmed electronic transmission that creates a record that may be retained, retrieved and reviewed by a recipient thereof, and that may be directly reproduced in paper form by such a recipient through an automated process, but specifically excluding facsimile transmissions and texts when transmitted, if transmitted on a business day and during normal business hours of the recipient, and otherwise on the next business day following transmission; certified mail, return receipt requested, postage prepaid, three business days after being deposited in the United States mail; or overnight carrier service or personal delivery, when received. For Key Notices, the Regional PLGs will follow up any electronic transmission with a hard copy of the communication by the means described above. All other communications or notices between the Regional PLGs that are not Key Notices may be done via electronic transmission. The Regional PLGs agree that any notice or communication transmitted by electronic transmission shall be treated in all manner and respects as an original written document; any such notice or communication shall be considered to have the same binding and legal effect as an original document. All Key Notices shall include a reference to the Regional Agreement, and Key Notices shall be given to the Regional PLGs at the following addresses:

17. GENERAL TERMS AND CONDITIONS

- 17.1. Independent Entities.** The Regional PLGs enter into this Regional Agreement as separate, independent governmental entities and shall maintain such status throughout.
- 17.2. Assignment.** This Regional Agreement shall not be assigned by any Regional PLG without the prior written consent of all Regional PLGs. Any assignment or subcontracting without such consent will be ineffective and void and will be cause for termination of this Regional Agreement.
- 17.3. Integration and Amendment.** This Regional Agreement represents the entire agreement between the Regional PLGs and terminates any oral or collateral agreement or understandings. This Regional Agreement may be amended only by a writing signed by the Regional PLGs. If any provision of this Regional Agreement is held invalid or unenforceable, no other provision shall be affected by such holding, and the remaining provision of this Regional Agreement shall continue in full force and effect.

- 17.4. No Construction Against Drafting Party.** The Regional PLGs and their respective counsel have had the opportunity to review the Regional Agreement, and the Regional Agreement will not be construed against any Regional PLG merely because any provisions of the Regional Agreement were prepared by a particular Regional PLG.
- 17.5. Captions and References.** The captions and headings in this Regional Agreement are for convenience of reference only and shall not be used to interpret, define, or limit its provisions. All references in this Regional Agreement to sections (whether spelled out or using the § symbol), subsections, exhibits or other attachments, are references to sections, subsections, exhibits or other attachments contained herein or incorporated as a part hereof, unless otherwise noted.
- 17.6. Statutes, Regulations, and Other Authority.** Any reference in this Regional Agreement to a statute, regulation, policy or other authority shall be interpreted to refer to such authority then current, as may have been changed or amended since the execution of this Regional Agreement.
- 17.7. Conflict of Interest.** No Regional PLG shall knowingly perform any act that would conflict in any manner with said Regional PLG's obligations hereunder. Each Regional PLG certifies that it is not engaged in any current project or business transaction, directly or indirectly, nor has it any interest, direct or indirect, with any person or business that might result in a conflict of interest in the performance of its obligations hereunder. No elected or employed member of any Regional PLG shall be paid or receive, directly or indirectly, any share or part of this Regional Agreement or any benefit that may arise therefrom.
- 17.8. Inurement.** The rights and obligations of the Regional PLGs to the Regional Agreement inure to the benefit of and shall be binding upon the Regional PLGs and their respective successors and assigns, provided assignments are consented to in accordance with the terms of the Regional Agreement.
- 17.9. Survival.** Notwithstanding anything to the contrary, the Regional PLGs understand and agree that all terms and conditions of this Regional Agreement and any exhibits that require continued performance or compliance beyond the termination or expiration of this Regional Agreement shall survive such termination or expiration and shall be enforceable against a Regional PLG if such Regional PLG fails to perform or comply with such term or condition.
- 17.10. Waiver of Rights and Remedies.** This Regional Agreement or any of its provisions may not be waived except in writing by a Regional PLG's authorized representative. The failure of a

Regional PLG to enforce any right arising under this Regional Agreement on one or more occasions will not operate as a waiver of that or any other right on that or any other occasion.

17.11. No Third-Party Beneficiaries. Enforcement of the terms of the Regional Agreement and all rights of action relating to enforcement are strictly reserved to the Regional PLGs. Nothing contained in the Regional Agreement gives or allows any claim or right of action to any third person or entity. Any person or entity other than the Regional PLGs receiving services or benefits pursuant to the Regional Agreement is an incidental beneficiary only.

17.12. Records Retention. The Regional PLGs shall maintain all records, including working papers, notes, and financial records in accordance with their applicable record retention schedules and policies. Copies of such records shall be furnished to the Parties request.

17.13. Execution by Counterparts; Electronic Signatures and Records. This Regional Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same instrument. The Regional PLGs approve the use of electronic signatures for execution of this Regional Agreement. All use of electronic signatures shall be governed by the Uniform Electronic Transactions Act, C.R.S. §§ 24-71.3-101, *et seq.* The Regional PLGs agree not to deny the legal effect or enforceability of the Regional Agreement solely because it is in electronic form or because an electronic record was used in its formation. The Regional PLGs agree not to object to the admissibility of the Regional Agreement in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

17.14. Authority to Execute. Each Regional PLG represents that all procedures necessary to authorize such Regional PLG's execution of this Regional Agreement have been performed and that the person signing for such Regional PLG has been authorized to execute the Regional Agreement.

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Colorado Opioids Settlement Memorandum of Understanding **Summary**

Below is a brief overview of the key provisions outlined in the Colorado Opioids Settlement Memorandum of Understanding (“Colorado MOU”). The Colorado MOU was signed by Colorado Attorney General Phil Weiser on August 26, 2021. In order to receive the full settlement payments for all of Colorado, strong participation by local governments signing on to the Colorado MOU is necessary.

Local governments and the State prepared the Colorado MOU, which prioritizes regionalism, collaboration, and abatement in the sharing and distribution of opioid settlement funds. The points below summarize the framework laid out in the Colorado MOU for distributing and sharing opioids settlement proceeds throughout Colorado. Please see the full Colorado MOU and exhibits for additional details.

While Colorado’s local governments are currently being asked to participate in recent settlements with the “Big 3” Distributors (AmerisourceBergen, Cardinal Health, and McKesson) and Johnson & Johnson, the Colorado MOU is intended to apply to all current and future opioid settlements.

A. Allocation of Settlement Funds

The Colorado MOU provides the framework for fairly dividing and sharing settlement proceeds among the state and local governments in Colorado. Under the Colorado MOU, settlement proceeds will be distributed as follows:

- 1. 10%** directly to the State (“State Share”)
- 2. 20%** directly to Participating Local Governments (“LG Share”)
- 3. 60%** directly to Regions (“Regional Share”)
- 4. 10%** to specific abatement infrastructure projects (“Statewide Infrastructure Share”)

Under the Colorado MOU, all settlement funds must be used only for “Approved Purposes,” a long and broad list that focuses on abatement strategies. These strategies emphasize prevention, treatment, and harm reduction. Some examples of these strategies include training health care providers on opioid use disorder (“OUD”) treatment and responsible prescribing, expanding telehealth and mobile services for treatment, and increasing naloxone and rescue breathing supplies. The list of Approved Purposes is broad enough to be flexible for local communities, while ensuring that settlement funds are used to combat the opioid epidemic. The list of Approved Purposes is attached as Exhibit A to the MOU, unless the term is otherwise defined in a settlement.

B. General Abatement Fund Council

A General Abatement Fund Council (the “Abatement Council”), consisting of representatives appointed by the State and Participating Local Governments, will ensure that the distribution of opioid funds complies with the terms of any settlement and the terms of the Colorado MOU. The Abatement Council will consist of 13 members, seven appointed by the State and six appointed by the Participating Local Governments.

C. Local Government Share (20%)

Twenty percent of settlement funds will be paid directly to Participating Local Governments. Exhibit D to the Colorado MOU lists the percentage to each County Area (that is, the county government plus the municipalities within that county), and Exhibit E further breaks down those allocations to an intracounty level using a default allocation.

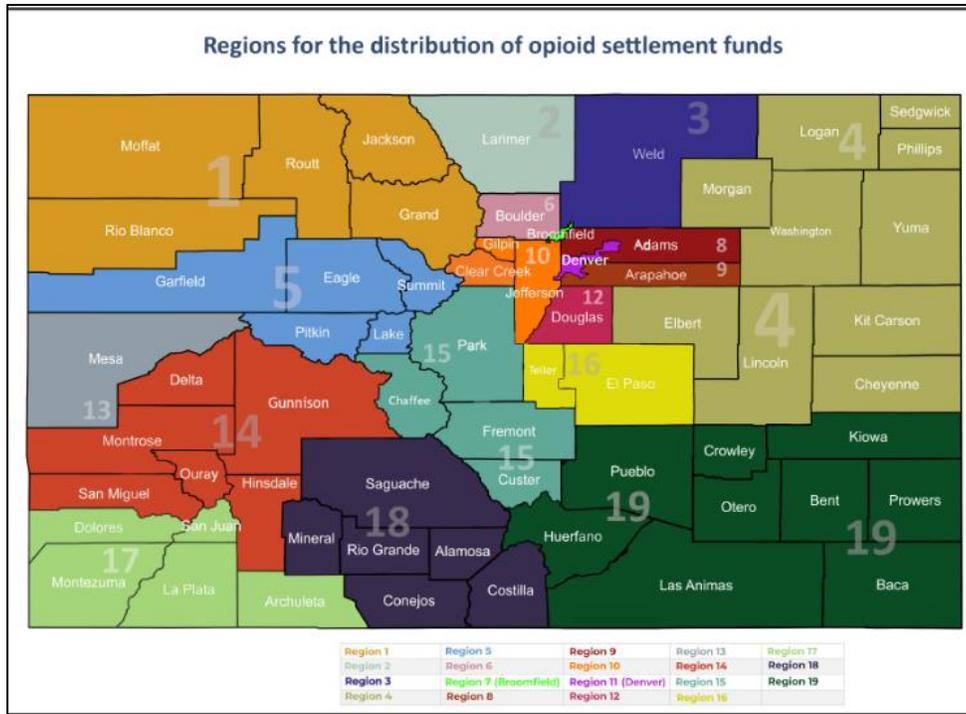
The allocations to each County Area in Exhibit D are based on three factors that address critical causes and effects of the opioid crisis: (1) the number of persons suffering opioid use disorder in the county; (2) the number of opioid overdose deaths that occurred in the county; and (3) the amount of opioids distributed within the county.

The intracounty allocations in Exhibit E are a default allocation that will apply unless the local governments in a County Area enter into a written agreement providing for a different allocation. These allocations are based on a model, developed by health economist experts, which uses data from the State and Local Government Census on past spending relevant to opioid abatement.

Participating Local Governments will provide data on expenditures from the LG Share to the Abatement Council on an annual basis. If a local government wishes, it may forego its LG Share and direct it to the Regional Share. A local government that chooses not to participate or sign onto the Colorado MOU will not receive funds from the LG Share and the portion of the LG Share that it would have received will instead be re-allocated to the Regional Share for the region where that local government is located.

D. Regional Share (60%)

Sixty percent of settlement funds will be allocated to single- or multi-county regions made up of local governments. These regions were drawn by local governments to make use of existing local infrastructure and relationships. The regional map is shown below, as well as in Exhibit C to the Colorado MOU:



Allocations to regions will be calculated according to the percentages in Exhibit F. Each region will create its own “Regional Council” to determine what Approved Purposes to fund with that region’s allocation from the Regional Share. Regional governance models are attached to the Colorado MOU as Exhibit G. Each region may draft its own intra-regional agreements, bylaws, or other governing documents to determine how the Regional Council will operate, subject to the terms of the Colorado MOU. Each Regional Council will provide expenditure data to the Abatement Council on an annual basis.

A local government that chooses not to participate or sign onto the Colorado MOU shall not receive any opioid funds from the Regional Share and shall not participate in the Regional Councils.

E. State Share (10%)

Ten percent of settlement funds will be allocated directly to the State for statewide priorities in combating the opioid epidemic. The State maintains full discretion over distribution of the State Share anywhere within the State of Colorado. On an annual basis, the State shall provide all data on expenditures from the State Share, including administrative costs, to the Abatement Council.

F. Statewide Infrastructure Share (10%)

Ten percent of the settlement funds will be allocated to a Statewide Infrastructure Share to promote capital improvements and provide operational assistance for the development or improvement of infrastructure necessary to abate the opioid crisis anywhere in Colorado.

The Abatement Council shall establish and publish policies and procedures for the distribution and oversight of the Statewide Infrastructure Share, including processes for local governments or regions to apply for opioid funds from the Statewide Infrastructure Share.

G. Attorneys' Fees and Expenses Paid Through a Back-Stop Fund

To a large extent, the national opioid settlements occurred because of the pressure that litigating entities and their counsel exerted on defendants through their lawsuits. The attorneys' fee provision equitably allocates the cost of attorneys' fees, while also allowing non-litigating entities to share in the 25% premium for releases by the litigating entities in the "Big 3" Distributor and Johnson & Johnson settlements. The work that was done by the litigating entities and their law firms in the litigation has substantially contributed to achieving the settlements that are currently being offered and those that are anticipated in the future.

The Attorney General and local governments have agreed to a "Back-Stop Fund" for attorneys' fees and costs. Before a law firm can apply to the Back-Stop Fund, it must first apply to any national common benefit fee fund. The Back-Stop Fund will only be used to pay the difference between what law firms are owed and the amount they have received from a national common benefit fee fund.

Attorneys' fees are limited to 8.7% of the total LG Share and 4.35% of the total Regional Share. No funds will be taken from the Statewide Infrastructure Share or State Share.

A committee will be formed to oversee payments from the Back-Stop Fund. The committee will include litigating and non-litigating entities. Importantly, any excess money in the Back-Stop fund, after attorneys' fees and costs are paid, will go back to the local governments.

H. Participation in the Colorado MOU and Expected Timeline

The MOU was designed to ensure that as many local governments as possible would agree to its terms. Strong participation from local governments is needed to receive the full settlement payments for all of Colorado. On August 26, 2021, Colorado Attorney General Phil Weiser signed the MOU. It is projected that settlement funds from the "Big 3" Distributor/Johnson & Johnson settlements could be made available as soon as July 2022 and will be distributed within Colorado according to the MOU.

Along with the MOU, each local government will need to sign a Subdivision Settlement Participation Form for each of the settlements (the "Big 3" Distributor settlement and the Johnson & Johnson settlement) releasing their legal claims and stating they are participating in the settlements. In addition, a Colorado Subdivision Escrow Agreement should be signed to ensure legal claims are released only when 95% participation by certain local governments has been reached. That 95% participation threshold is important because it triggers certain amounts of incentive payments under the settlements and signals to the settling pharmaceutical companies that the settlements have wide acceptance.

A copy of the MOU with signature pages for each local government, the Subdivision Settlement Participation Forms, and the Colorado Subdivision Escrow Agreement will be

provided by the Attorney General's Office. The documents should be executed by the individual or body with authority to do so on behalf of their respective county or municipality and submitted by mail or email to either CCI or CML at the following addresses:

<p><u>For Counties:</u></p> <p>Colorado Counties, Inc. 800 Grant, Ste 500 Denver, CO 80203</p> <p>Email: Kyley Burress at KBurress@ccionline.org Katie First at KFirst@ccionline.org</p>	<p><u>For Municipalities:</u></p> <p>Colorado Municipal League 1144 N. Sherman St. Denver, CO 80203</p> <p>Email: opioidsettlement@cml.org</p>
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If you have any questions, please reach out to Heidi Williams of the Colorado AG's office at Heidi.Williams@coag.gov.

EXHIBIT K

Settlement Participation Form

Governmental Entity:	State:
Authorized Official:	
Address 1:	
Address 2:	
City, State, Zip:	
Phone:	
Email:	

The governmental entity identified above (“Governmental Entity”), in order to obtain and in consideration for the benefits provided to the Governmental Entity pursuant to the Settlement Agreement dated July 21, 2021 (“Janssen Settlement”), and acting through the undersigned authorized official, hereby elects to participate in the Janssen Settlement, release all Released Claims against all Released Entities, and agrees as follows.

1. The Governmental Entity is aware of and has reviewed the Janssen Settlement, understands that all terms in this Election and Release have the meanings defined therein, and agrees that by this Election, the Governmental Entity elects to participate in the Janssen Settlement and become a Participating Subdivision as provided therein.
2. The Governmental Entity shall, within 14 days of the Reference Date and prior to the filing of the Consent Judgment, dismiss with prejudice any Released Claims that it has filed.
3. The Governmental Entity agrees to the terms of the Janssen Settlement pertaining to Subdivisions as defined therein.
4. By agreeing to the terms of the Janssen Settlement and becoming a Releasor, the Governmental Entity is entitled to the benefits provided therein, including, if applicable, monetary payments beginning after the Effective Date.
5. The Governmental Entity agrees to use any monies it receives through the Janssen Settlement solely for the purposes provided therein.
6. The Governmental Entity submits to the jurisdiction of the court in the Governmental Entity’s state where the Consent Judgment is filed for purposes limited to that court’s role as provided in, and for resolving disputes to the extent provided in, the Janssen Settlement.
7. The Governmental Entity has the right to enforce the Janssen Settlement as provided therein.

8. The Governmental Entity, as a Participating Subdivision, hereby becomes a Releasor for all purposes in the Janssen Settlement, including but not limited to all provisions of Section IV (Release), and along with all departments, agencies, divisions, boards, commissions, districts, instrumentalities of any kind and attorneys, and any person in their official capacity elected or appointed to serve any of the foregoing and any agency, person, or other entity claiming by or through any of the foregoing, and any other entity identified in the definition of Releasor, provides for a release to the fullest extent of its authority. As a Releasor, the Governmental Entity hereby absolutely, unconditionally, and irrevocably covenants not to bring, file, or claim, or to cause, assist or permit to be brought, filed, or claimed, or to otherwise seek to establish liability for any Released Claims against any Released Entity in any forum whatsoever. The releases provided for in the Janssen Settlement are intended by the Parties to be broad and shall be interpreted so as to give the Released Entities the broadest possible bar against any liability relating in any way to Released Claims and extend to the full extent of the power of the Governmental Entity to release claims. The Janssen Settlement shall be a complete bar to any Released Claim.
9. In connection with the releases provided for in the Janssen Settlement, each Governmental Entity expressly waives, releases, and forever discharges any and all provisions, rights, and benefits conferred by any law of any state or territory of the United States or other jurisdiction, or principle of common law, which is similar, comparable, or equivalent to § 1542 of the California Civil Code, which reads:

General Release; extent. A general release does not extend to claims that the creditor or releasing party does not know or suspect to exist in his or her favor at the time of executing the release that, if known by him or her, would have materially affected his or her settlement with the debtor or released party.

A Releasor may hereafter discover facts other than or different from those which it knows, believes, or assumes to be true with respect to the Released Claims, but each Governmental Entity hereby expressly waives and fully, finally, and forever settles, releases and discharges, upon the Effective Date, any and all Released Claims that may exist as of such date but which Releasors do not know or suspect to exist, whether through ignorance, oversight, error, negligence or through no fault whatsoever, and which, if known, would materially affect the Governmental Entities' decision to participate in the Janssen Settlement.

10. Nothing herein is intended to modify in any way the terms of the Janssen Settlement, to which Governmental Entity hereby agrees. To the extent this Election and Release is interpreted differently from the Janssen Settlement in any respect, the Janssen Settlement controls.

I have all necessary power and authorization to execute this Election and Release on behalf of the Governmental Entity.

Signature: _____

Name: _____

Title: _____

Date: _____

EXHIBIT K

Subdivision Settlement Participation Form

Governmental Entity:	State:
Authorized Official:	
Address 1:	
Address 2:	
City, State, Zip:	
Phone:	
Email:	

The governmental entity identified above (“*Governmental Entity*”), in order to obtain and in consideration for the benefits provided to the Governmental Entity pursuant to the Settlement Agreement dated July 21, 2021 (“*Distributor Settlement*”), and acting through the undersigned authorized official, hereby elects to participate in the Distributor Settlement, release all Released Claims against all Released Entities, and agrees as follows.

1. The Governmental Entity is aware of and has reviewed the Distributor Settlement, understands that all terms in this Participation Form have the meanings defined therein, and agrees that by signing this Participation Form, the Governmental Entity elects to participate in the Distributor Settlement and become a Participating Subdivision as provided therein.
2. The Governmental Entity shall, within 14 days of the Reference Date and prior to the filing of the Consent Judgment, secure the dismissal with prejudice of any Released Claims that it has filed.
3. The Governmental Entity agrees to the terms of the Distributor Settlement pertaining to Subdivisions as defined therein.
4. By agreeing to the terms of the Distributor Settlement and becoming a Releasor, the Governmental Entity is entitled to the benefits provided therein, including, if applicable, monetary payments beginning after the Effective Date.
5. The Governmental Entity agrees to use any monies it receives through the Distributor Settlement solely for the purposes provided therein.
6. The Governmental Entity submits to the jurisdiction of the court in the Governmental Entity’s state where the Consent Judgment is filed for purposes limited to that court’s role as provided in, and for resolving disputes to the extent provided in, the Distributor Settlement. The Governmental Entity likewise agrees to arbitrate before the National Arbitration Panel as provided in, and for resolving disputes to the extent otherwise provided in, the Distributor Settlement.

7. The Governmental Entity has the right to enforce the Distributor Settlement as provided therein.
8. The Governmental Entity, as a Participating Subdivision, hereby becomes a Releasor for all purposes in the Distributor Settlement, including, but not limited to, all provisions of Part XI, and along with all departments, agencies, divisions, boards, commissions, districts, instrumentalities of any kind and attorneys, and any person in their official capacity elected or appointed to serve any of the foregoing and any agency, person, or other entity claiming by or through any of the foregoing, and any other entity identified in the definition of Releasor, provides for a release to the fullest extent of its authority. As a Releasor, the Governmental Entity hereby absolutely, unconditionally, and irrevocably covenants not to bring, file, or claim, or to cause, assist or permit to be brought, filed, or claimed, or to otherwise seek to establish liability for any Released Claims against any Released Entity in any forum whatsoever. The releases provided for in the Distributor Settlement are intended by the Parties to be broad and shall be interpreted so as to give the Released Entities the broadest possible bar against any liability relating in any way to Released Claims and extend to the full extent of the power of the Governmental Entity to release claims. The Distributor Settlement shall be a complete bar to any Released Claim.
9. The Governmental Entity hereby takes on all rights and obligations of a Participating Subdivision as set forth in the Distributor Settlement.
10. In connection with the releases provided for in the Distributor Settlement, each Governmental Entity expressly waives, releases, and forever discharges any and all provisions, rights, and benefits conferred by any law of any state or territory of the United States or other jurisdiction, or principle of common law, which is similar, comparable, or equivalent to § 1542 of the California Civil Code, which reads:

General Release; extent. A general release does not extend to claims that the creditor or releasing party does not know or suspect to exist in his or her favor at the time of executing the release, and that if known by him or her would have materially affected his or her settlement with the debtor or released party.

A Releasor may hereafter discover facts other than or different from those which it knows, believes, or assumes to be true with respect to the Released Claims, but each Governmental Entity hereby expressly waives and fully, finally, and forever settles, releases and discharges, upon the Effective Date, any and all Released Claims that may exist as of such date but which Releasors do not know or suspect to exist, whether through ignorance, oversight, error, negligence or through no fault whatsoever, and which, if known, would materially affect the Governmental Entities' decision to participate in the Distributor Settlement.

11. Nothing herein is intended to modify in any way the terms of the Distributor Settlement, to which Governmental Entity hereby agrees. To the extent this Participation Form is interpreted differently from the Distributor Settlement in any respect, the Distributor Settlement controls.

I have all necessary power and authorization to execute this Participation Form on behalf of the Governmental Entity.

Signature: _____

Name: _____

Title: _____

Date: _____

Colorado Subdivision Escrow Agreement

Governmental Entity:	State: CO
Authorized Official:	
Address 1:	
Address 2:	
City, State, Zip:	
Phone:	
Email:	

The governmental entity identified above (“*Governmental Entity*”) hereby provides Colorado Counties, Inc. (for counties) or the Colorado Municipal League (for municipalities) (“*Escrow Agent*”) the enclosed copies of the Governmental Entity’s endorsed Subdivision Settlement Participation Forms and the Colorado Opioids Settlement Memorandum of Understanding (“Colorado MOU”), to be held in escrow. The Subdivision Settlement Participation Forms apply respectively to (1) the National Settlement Agreement with McKesson Corporation, Cardinal Health, Inc., and AmerisourceBergen Corporation, dated July 21, 2021 (“*Distributor Settlement*”); and (2) the National Settlement Agreement with Janssen Pharmaceuticals, Inc., and its parent company Johnson & Johnson, dated July 21, 2021 (“*J&J Settlement*”). Pursuant to this Agreement, the Subdivision Settlement Participation Forms and the Colorado MOU will be released only if there is 95% participation by local governments in Colorado as further explained below.

Purpose of this Agreement

By endorsing a Subdivision Settlement Participation Form in the Distributor Settlement and the J&J Settlement, a governmental entity agrees to participate in those settlements and release any legal claims it has or may have against those settling pharmaceutical companies. This Colorado Subdivision Escrow Agreement is meant to ensure that the legal claims of governmental entities in Colorado will be released only when 95% participation by certain governmental entities has been reached. That 95% participation threshold is important because it signals to the settling pharmaceutical companies that the settlement has wide acceptance which will then secure significant incentive payments under these settlement agreements.

Escrow

The Escrow Agent shall promptly report the receipt of any Governmental Entity’s endorsed Subdivision Settlement Participation Forms and Colorado MOUs to the Colorado Attorney General’s Office and to the law firm of Keller Rohrback L.L.P. These documents shall be released by the Escrow Agent to the Colorado Attorney General’s Office if and when the Escrow Agent is notified by the Attorney General’s Office and Keller Rohrback that that the threshold 95% participation levels have been reached for both the Distributor Settlement and the J&J Settlement, as further described below. If by December 29, 2021, the Escrow Agent has not received notification that the threshold 95% levels have been reached for both the Distributor Settlement and the J&J Settlements, then the documents being escrowed shall be returned to the Governmental Entities and all copies shall be destroyed.

Distributor Settlement

The Attorney General’s Office and Keller Rohrback shall jointly submit a written notification to the Escrow Agent when it has been determined that the percentages of populations eligible for Incentives B and C, as described in Sections IV.F.2 and IV.F.3 of the Distributor Settlement, are each 95% or more. For purposes of this Escrow Agreement, the percentages of populations eligible for Incentives B and C under the Distributor Settlement will include governmental entities that sign a Subdivision Settlement Participation Form subject to an escrow agreement and governmental entities that sign a Subdivision Settlement Participation Form that is not subject to an escrow agreement.

J&J Settlement

The Attorney General’s Office and Keller Rohrback shall jointly submit a written notification to the Escrow Agent when it has been determined that the Participation or Case-Specific Resolution Levels for Incentives B and C, as described in Sections V.E.5 and V.E.6 of the J&J Settlement, are each 95% or more. For purposes of this Escrow Agreement, the percentages or populations eligible for Incentives B and C under the J&J Settlement will include governmental entities that sign a Subdivision Settlement Participation Form subject to an escrow agreement and governmental entities that sign a Subdivision Settlement Participation Form that is not subject to an escrow agreement.

Colorado Subdivision Name _____

Authorized Signature

Date