HAZARD MITIGATION PLAN

2026

BASE PLAN

JEFFERSON COUNTY COLORADO

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Professional planning services for this plan update were provided by:

SYNERGY DISASTER RECOVERY

Executive Summary

The 2026 Jefferson County Hazard Mitigation Plan (HMP) outlines a comprehensive strategy to reduce long-term risks to residents, property, infrastructure, natural resources, and essential services from natural and human-caused hazards. Building on the 2022 HMP, this update reflects current risks and community priorities while maintaining eligibility for FEMA and mitigation funding opportunities.

Jefferson County faces hazards shaped by its Front Range location, varied terrain, development patterns, and changing climate conditions. The plan evaluates risks from dam incidents, drought, earthquakes, extreme heat, flooding, ground instability, hail, lightning, severe winds, severe winter weather, slope failure, tornadoes, wildfires, cyberattacks, and pandemics. The updated risk assessment incorporates recent events, new data, critical facilities, community lifelines, development trends, climate considerations, and social vulnerability to identify areas where mitigation can have the greatest impact.

Developed with input from county officials, local governments, fire protection districts, special districts, regional and state agencies, community groups, and the public, including considerations for people with access and functional needs, the plan's mitigation strategy emphasizes three main targets. These are enhancing public education and awareness, reducing vulnerability through improved land use, infrastructure, and preparedness, and protecting critical facilities. It also aims to foster stronger partnerships among agencies, jurisdictions, and community organizations.

Since the last plan, efforts have included improved flood notification, drainage upgrades, wildfire planning, public outreach, and GIS data enhancement. The 2026 actions build on this progress with projects targeting flood risk mitigation, dam safety, drought resilience, hazard awareness, backup power, wildfire fuel reduction, structure hardening, and redundant communication systems. Continuous implementation, annual review, public engagement, and coordination with other plans will support Jefferson County's goal of reducing future losses and strengthening community resilience.

1 Mitigation Strategy

The mitigation strategy is a crucial component of the hazard mitigation plan (HMP) and reflects the primary outcome of the planning process. It offers a long-term approach to reducing vulnerabilities highlighted in the **HAZARD IDENTIFICATION AND RISK ASSESSMENT**. The strategy outlines how Jefferson County, in coordination with local governments, will mitigate the impacts of hazards on its residents, businesses, and visitors.

1.1 Mitigation Goals & Objectives

The Planning Team has identified the following goals and objectives as the overarching framework for Jefferson County's hazard mitigation strategy. These broad goals express the overall, long-term vision for mitigating hazards throughout the county. The associated objectives identify how these goals will be implemented. This mitigation strategy is carried over from the 2022 HMP, with minor edits to a few objectives.

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) Empower residents 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) Strengthen and enforce land use regulations, development standards, and review processes that reduce the vulnerability of structures and infrastructure to natural hazards.
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) Continue Community Wildfire Protection Planning (CWPP) efforts, including periodic updates and implementation of wildfire mitigation, including wildfire fuel breaks, defensible space, fuels reduction, and biomass use.
f) Increase wildfire mitigation efforts specifically on public lands and open space.
g) Reduce the economic impact to public and private entities from hazards.
h) Enhance the ability of businesses to mitigate and recover from disasters.
i) Continue to reduce flood losses through compliance with National Flood Insurance Program, and continue to participate with Community Rating System, where applicable.
j) Encourage measures to enable the County and jurisdictions to better withstand a multi-year drought.
k) Improve wildfire education and training for dispatchers and emergency responders.
l) Improve the ability of local government and the private sector to defend against and recover from cyber attacks.
m) Identify more systemic preparation/adaptation to reduce more chronic but widespread impacts, such as strain on the power grid and premature aging of infrastructure.
n) 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 stakeholders involved in hazard mitigation and response.
b) Maximize shared resources to leverage funding for hazard mitigation projects and community resilience projects for all levels of government.
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) Implement the recommendations from the Jefferson County Wildfire Commission.

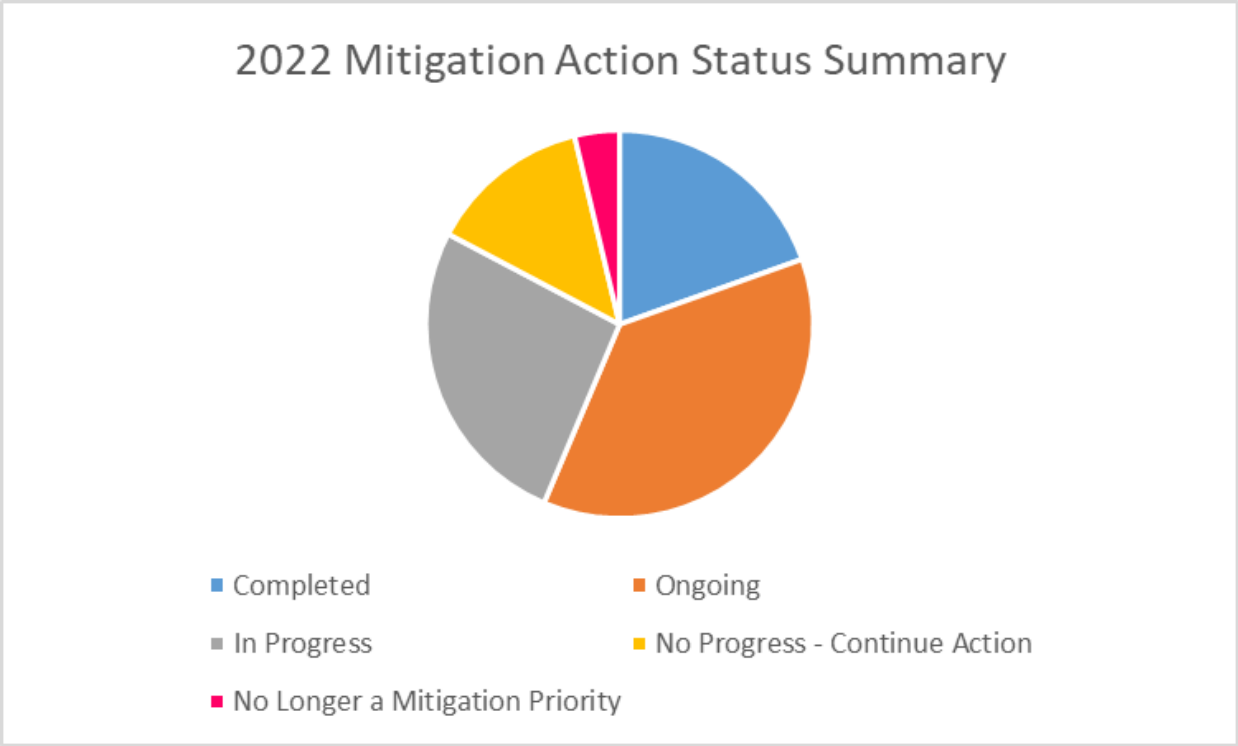
1.2 2022 Mitigation Actions

As part of the plan update process, the Hazard Mitigation Planning Team reviewed and reported on the status of all mitigation actions (i.e., projects) identified in the 2022 HMP. **FIGURE 1** provides a summary overview of the status of each previous mitigation action. Additional details on progress toward making Jefferson County more resilient to hazards are provided on the following pages. Status updates for each participating local government are available in their respective local government HMP annexes.

Just as recognizing completed projects is important, ongoing community actions are often overlooked as examples of successful implementation of mitigation strategies. Ongoing projects lack a fixed end date but have continued milestones. Examples include education and outreach efforts, maintenance activities, ongoing plan updates, organizational coordination, and continuous efforts to enhance processes and infrastructure.

The Action Identifiers from the previous HMP are provided for reference in parentheses. Any mitigation actions that are reported as 'Ongoing', 'In Process', or 'No Progress – Continue Action' have been carried over this HMP's new actions. For additional action details, see **2026 MITIGATION ACTIONS**.

Figure 1 Summary of Status of 2022 Mitigation Actions



- **Completed**
  - (Jefferson County 3) Weaver Creek major drainage master plan and Flood Hazard Area Delineation (FHAD). Study completed in 2023.
  - (Jefferson County 4) Notification polygons for dam failure and flash flooding. Jeffcom 911 has floodplain and dam polygons in Lookout Alert.
  - (Jefferson County 13) Storm Ready program participation. Jefferson County renewed their Storm Ready status on February 26, 2025. This status will be valid until August 9, 2029.
  - (Jefferson County 29) Development and formalization of a standing Local Hazard Mitigation Committee. The All-Hazard Mitigation Advisory Committee (AHMAC) was created in 2023 and officially disbanded in 2025.
  - (Jefferson County 30) Drainage and flood control improvement for Weaver Creek at Belleview Avenue. Completed in 2025.
  - (Jefferson County 34) Rockfall hazard advisory and education.

- **Ongoing**
  - (Jefferson County 5) Update Community Wildfire Protection Plans (CWPPs) to reflect changing conditions and new development. Both the county and many fire protection districts have completed updates to their CWPPs in recent years. Additional updates are currently being worked on. The county has invested in the Jefferson County Wildland Fire Management program, which includes staffing to assist with and/or lead future CWPP updates at both the county and fire protection district levels.
  - (Jefferson County 6) Mitigate wildfire hazards on public lands and open space properties. County-level actions have been limited for project implementation. Focus has been on planning (updating the CWPP), which has provided the roadmap for moving forward. The county is in the process of building out a Wildland Fire Management program that will focus primarily on mitigation work.
  - (Jefferson County 10) Perform hazard fuel mitigation in areas identified as high hazard in countywide and individual CWPPs. The Jefferson County Sheriff's Office (JCSO) has not implemented fire mitigation projects over the past five years but has instead focused on planning and moving forward, making a significant investment in the Jefferson County Wildland Fire Management program.
  - (Jefferson County 17) Discovery of a community-wide slash collection center. The Sustainable Lands and Safer Homes (SLASH) program was established, and additional opportunities for growth are being developed. One permanent site has been developed, Tin Cup. Equipment was obtained through grant funding. Currently researching another permanent location for the foothills.
  - (Jefferson County 18) Forest health.
  - (Jefferson County 19) Habitat restoration.
  - (Jefferson County 20) Fuel break thinning in right-of-way along evacuation routes within the Wildfire Urban Interface (WUI).
  - (Jefferson County 35) Create a county-wide clearinghouse for past, present and future wildfire mitigation efforts. This remains a goal of the Jefferson County Wildfire Commission, but implementation will be facilitated through the county's Wildland Fire Management

Program moving forward. A full-time Geographic Information System (GIS) Specialist has been hired, and work with all county fire partners has begun on fire incident and mitigation project mapping, data validation, data sharing processes, and other related spatial data components.

- (Jefferson County 36) Create, brand, maintain, and promote a one-stop webpage on reducing wildfire risk in Jefferson County**.** This remains a goal of the Jefferson County Wildfire Commission. Moving forward, Wildland Fire Management will be the lead on this effort. Working groups were formed in late 2025, and progress was made on the type of content, common messaging, processes for communicating key messages, and development of a consolidated one-stop shopping web platform to share information. Fire partners from across the county are involved, and the goal is to have an updated website within the Sheriff's Office Wildland Fire Management program to serve as this platform by mid-2026.
- (Jefferson County 37) Implement residential wildfire mitigation program. Many fire protection districts throughout the county have implemented a home assessment program. In June 2025, the county made a substantial investment in developing a Wildland Fire Management program. One component of this program is dedicated staff for community support programs, including a county home assessment program. The Wildland Fire Management program will hire a dedicated crew to conduct home assessments and will use a software platform for this purpose. The program has been working with fire partners to evaluate the needs and operations with the goal of having all partners use the common platform. This will create efficiencies and support partners in this work.

- **In Progress**
  - (Jefferson County 1) Major drainageway culvert improvements with Mile High Flood District (MHFD).
  - (Jefferson County 2) Minor culvert improvements.

- (Jefferson County 7) Develop partnerships and begin needs assessment for seismic mitigation of critical infrastructure within the county.
- (Jefferson County 8) Education and awareness of geologic hazards. Jefferson County Planning & Zoning will lead efforts related to expansive soils, landslides, rockfall, and subsidence hazards. Jefferson County Sheriff's Office of Emergency Management (OEM) will continue developing the all-hazards public outreach campaign.
- (Jefferson County 9) Flood education and outreach.
- (Jefferson County 12) National Flood Insurance Program (NFIP) and Community Rating System (CRS) participation.
- (Jefferson County 14) Bi-lingual publications. The OEM's preparedness and public outreach campaigns have been nonexistent prior to 2025. Expanded staffing has enabled the OEM to launch and continue to improve and expand a community outreach program. Publications and informational guides continue to be developed, and translation into Spanish is underway. Census data will be reviewed to ascertain how many additional languages are needed.
- (Jefferson County 16) Geographic Information System (GIS) layer updates. Prior to 2025, minimal progress had been made in spatial data management. A full-time GIS Specialist has been hired, and data collection, management, and sharing processes have been established with county partners. A mapping platform has been built to track mitigation projects, accurate fire history information, and strategic planning needs. This information will help prioritize mitigation projects moving forward, and the Wildland Fire Management Program will serve as the county's fire management data authority.
- (Jefferson County 21) Stabilize the landslide near the reinforced soil slope (RSS) at the Rocky Mountain Metropolitan Airport (RMMA).
- (Jefferson County 22) Defensible space and structure hardening mitigation grant fund. One component of this new Wildland Fire Management program is community engagement and support, which will include a county micro-grant program to support

homeowners in mitigation (defensible space and home hardening) work. Staff continues to be hired to manage the program, grant and county funding has been secured to fund the grant, and the county expects the program to be operational in early 2026.

- (Jefferson County 23) County road clear zone fund. The Wildland Fire Management program will include mitigation crews to implement high-priority projects. The updated county CWPP identified over 270 miles of very high, high, and moderate roadway segments in need of mitigation to facilitate evacuations and fire response. These road segments will be incorporated into the plan for future fire mitigation crew work.
- (Jefferson County 24) Modernize existing Federal Emergency Management Agency (FEMA) Zone A floodplains that are outside the Mile High Flood District (MHFD) utilizing Lidar. Budget request did not move forward, will ask for it again in 2026.
- (Jefferson County 25) Update FEMA Zone AE floodplains that are outside of the MHFD. The Budget request did not move forward, but will ask for it again in 2026.
- (Jefferson County 26) Update the South Fork of Deer Creek floodplain. Budget request did not move forward, will ask for it again in 2026.
- (Jefferson County 27) Purchase properties from the Special Flood Hazard Area (SFHA) to reduce flood losses.
- (Jefferson County 28) Bear Creek bank stabilization.
- (Jefferson County 32) Drainage and flood improvements for Leyden Creek at Croke Canal. Mile High Flood District (MHFD) is conducting a master study. MHFD is leading these efforts, with the kickoff occurring in the Summer of 2025.
- (Jefferson County 33) Hazard Education and Outreach. The Wildland Fire Management program will serve as the lead county entity for fire-related education and outreach activities, but will coordinate with the Office of Emergency Management (OEM) on all-hazard outreach efforts. In addition, Wildland Fire Management Program has secured two federal grants in 2025 with specific education and outreach metrics, which will increase opportunities and set

program goals. The Office of Emergency Management (OEM) expanded its staffing in January 2025, enhancing its capacity for community engagement and preparedness initiatives. OEM has developed and continues to enhance informational preparedness guides utilized during community outreach events. In 2025, OEM engaged with approximately 5,000 community members through outreach efforts and aims to significantly increase public engagement in the coming years.

  - (Jefferson County 38) Polly Deane Reservoir remediation. The last work completed on Polly Deane was in the summer of 2019. In October of 2025, OEM received information from the State Mitigation Officer that FEMA approved the Polly Deane Rehab project to proceed with construction. Jefferson County Parks & Open Space and the Bergen Ditch and Reservoir Company are working with the state on this project.

- **No Progress – Continue Action**
  - (Jefferson County 11) South Weir Gulch remediation. This project is on the list to be completed in 2026; the impediment due to competing priorities and funding.
  - (Jefferson County 15) Public awareness for those in dam inundation areas. Floodplain and dam polygons exist in Lookout Alert to provide notifications during an incident. Expanded staffing has enabled OEM to launch, continue to develop, and promote a community outreach program. Publications and informational guides continue to be developed, and translation into Spanish is underway. Census data will be reviewed to ascertain how many additional languages are needed.
  - (Jefferson County 31) Drainage and flood control improvement for Dutch Creek at Yukon Street. This project is still on the list, Impediment due to competing priorities. Work is anticipated to begin in 2027.

1.2.1 Mitigation Successes

In addition to those actions outlined in the previous HMP, the county has achieved additional mitigation successes since 2022. The following is a summary of those

efforts. Participating local governments' mitigation successes can be found in the local government annexes:

- Jefferson County made a substantial investment in developing and launching a Wildland Fire Management program within the Jefferson County Sheriff's Office. The goal of the Wildland Fire Management program is to establish a holistic program to protect the residents and visitors of Jefferson County from catastrophic wildfire threats. The public can expect to see efforts to increase fire preparedness and fire response. These efforts will include thirty-seven new staff positions, wildfire education and outreach, a homeowner assessment and certification program, micro-grants for defensible space and home hardening, increased county capacity for fire protection district support, and increased fire management resources.
- Mitigation successes in Jefferson County include increasing the pace and scale of wildfire mitigation projects aimed at reducing fire risk. The county and its partners have secured grant funding to support these efforts, particularly for the development and updating of Community Wildfire Protection Plans (CWPPs). Jefferson County's CWPP was updated and adopted by the Board of County Commissioners in October 2024.
- Over the past five years, CWPPs have been completed or updated for the Coal Creek Canyon Fire Protection District, Evergreen Fire Protection District, Elk Creek and Inter-Canyon Fire Protection Districts, Genesee Fire Protection District, and Indian Hills Fire Protection District. In addition, the City of Golden and the City of Arvada have developed CWPPs to guide local wildfire mitigation efforts.
- The Office of Emergency Management (OEM) expanded its staffing in January 2025, enhancing its capacity for community engagement and preparedness initiatives. These efforts will enhance Jefferson County's mitigation capabilities by increasing public awareness of local hazards, preparedness actions, and risk reduction strategies. Expanded community outreach and the development of accessible preparedness materials will help residents better understand potential threats and take proactive measures to reduce their vulnerability before disasters occur. Increased engagement with the public also strengthens community resilience, supports informed decision-making, and fosters stronger

partnerships between residents and emergency management personnel. As outreach efforts continue to grow, Jefferson County will be better positioned to promote a culture of preparedness and reduce the long-term impacts of natural and human-caused hazards.

- As part of the Together Jeffco initiative, the Jefferson County Board of County Commissioners adopted the Evacuation Annex, in October 2024, to strengthen coordinated emergency planning and community preparedness efforts across the county. The Evacuation Annex establishes a comprehensive framework for evacuation coordination, public information, transportation considerations, and support for vulnerable populations during emergencies. By identifying roles, responsibilities, and operational procedures in advance, the plan enhances Jefferson County's ability to safely and efficiently move residents out of harm's way during incidents such as wildfires, floods, hazardous materials releases, and other emergencies. The adoption of the Evacuation Annex supports hazard mitigation efforts by reducing risk to life and property, improving interagency coordination, and increasing the county's overall resilience to future disasters.

1.3 2026 Mitigation Actions

A mitigation action is a measure, project, plan, or activity proposed to reduce or eliminate current and future vulnerabilities to hazards. These actions help achieve the HMP's goals and are a key outcome of the planning process.

As part of the HMP update, the Planning Team compiled a revised list of mitigation actions to implement over the next five years. During the planning process, the Planning Team was informed of a comprehensive range of mitigation action types to consider. These actions include the protection of natural systems and nature-based solutions, education and awareness programs, structural and infrastructure projects, and local plans and regulations. Planning Team workshops were held throughout the planning process to educate team members about mitigation resources. The focus was on identifying actions to reduce vulnerabilities in new and existing structures and infrastructure.

After identifying the 2026 mitigation actions, each participating local government prioritized the actions. According to the Federal Emergency Management Agency (FEMA) mitigation planning requirements, any prioritization system should

emphasize the extent to which benefits are maximized. This requires a planning-level assessment of whether the costs are reasonable compared to the probable benefits of an action (positive cost-benefit). Benefits may include preventing damage to structures and infrastructure, saving lives, reducing injuries, improving quality of life, and protecting ecosystems.

The Planning Team reviewed FEMA's STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) methodology and several additional criteria to determine those that the county would utilize. Ultimately, actions were prioritized based on their ability to reduce loss of life and property, improve evacuation and lifeline resilience, protect vulnerable populations and critical facilities, provide multi-hazard benefits, align with Jefferson County planning and land-use processes, and be implemented feasibly and cost-effectively.

During the planning process, the Planning Team decided that each government would prioritize mitigation actions using a three-tiered qualitative methodology: High, Moderate, or Low.

- High Priority: These are critical and urgent actions that address a significant and imminent threat to life safety and critical infrastructure. They are cost-effective, technically feasible, and have strong public support. These projects are considered essential for the community's immediate safety and well-being.
- Moderate Priority: These actions are important for reducing risk and protecting property but may address a less immediate or severe threat than high-priority items. They are generally cost-effective and feasible, but may have a longer implementation timeframe or require further study.
- Low Priority: These actions are desirable for further risk reduction but are not considered urgent. They may have a lower benefit-cost ratio, address a less significant hazard, or face implementation challenges such as funding constraints or a lack of political support. These projects are often considered for implementation as resources become available.

To ensure this updated HMP complies with FEMA policy, at least one mitigation action has been identified for each profiled natural hazard. Actions being carried forward from the 2022 HMP, those with a status of ongoing, in progress, and continuing, include reference to that original project identifier within parentheses.

As noted in **4.1 Risk Assessment Overview**, and in the local government annexes, certain hazards were identified as affecting the county but do not currently pose an immediate or significant risk to local -governments. These hazard risks are marked as not applicable (N/A), and no mitigation actions have been assigned in these cases.

The list below provides the full details of all the county's new mitigation actions in this updated 2026 HMP. It should be noted that, for potential funding sources, the term "local funding" includes staff time. Ongoing projects note a completion timeframe of 2031 as these are continually being implemented.

Each local government will implement multi-jurisdictional actions independently, with no overarching lead organization. Updated actions for each participant are available in their respective HMP annexes.

Figure 2 Mitigation Strategy Components

1.3.1 Dam Incident

- JC1 | County and dam owner partnership. | HHPD: The county will collaborate with dam owners to assess potential risks associated with dam failure and enhance communication protocols to provide residents with earlier and more effective warnings during such events.
    - Priority: High
    - Local Govt. Lead: Planning & Zoning Director

    - Partnering Org(s): Colorado Dam Safety, Jeffcom 911, Jefferson County Sheriff's Office of Emergency Management (OEM)
    - Relevant Goal(s): 3
    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program
- JC3 | Public awareness for those in dam inundation areas. | There are 30 High Hazard and 11 Significant Risk dams in Jefferson County. Jeffcom will issue emergency notifications to those during an incident. The goal is to develop and distribute informational materials specific to dam inundation hazards and emergency notification procedures, including guidance on how to register for emergency alerts. These materials will be provided to residents, homeowners, and businesses located within identified dam inundation areas to increase awareness, preparedness, and timely access to critical emergency information. It will be similar to the mailer distributed to people who live in floodplains. Part of this project is to create digital layers of the inundation maps for incorporation into the county's GIS database. Benefits include notification to those living in dam inundation areas will increase their awareness that they are in a higher-hazard area. The hope is that this awareness will improve preparedness for those in the area. This, along with better mapping, will improve warning capabilities, potentially saving lives in the event of a disaster. Ongoing action. (Previously Action # Jefferson County 15)
    - Priority: High
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Jeffcom 911, Jefferson County Business Innovation & Technology (BIT), Jefferson County Planning & Zoning, Colorado Dam Safety Branch
    - Relevant Goal(s): 1
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding
- JC2 | Dam condition assessment and improvement study. | HHPD: Jefferson County will conduct scoping studies to identify and develop

strategies for improving dams with unsatisfactory conditions that could threaten people and property within county boundaries.
    - Priority: Medium
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Colorado Dam Safety Branch, Jefferson County Sheriff's Office of Emergency Management (OEM)
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Emergency Management Performance Grant (EMPG), National Dam Safety Program (NDSP) State Assistance Grant, FEMA Rehabilitation of High Hazard Potential Dams (HHPD) Grant
- JC4 | Polly Deane Reservoir Remediation. | Polly Deane Reservoir, situated in Easton Regional Park, is owned by the Bergen Ditch and Reservoir Company. This artificial lake was expanded in part during the mid-1970s and lies within an urban setting. It primarily serves as an irrigation water storage facility for the Foothills Park and Recreation District, a major shareholder of Bergen (including shares leased from Jefferson County). In spring 2019, seepage was found below the dam, prompting the Colorado Dam Safety Branch to limit how much water can be stored in the reservoir. To address the problem, Bergen obtained a FEMA grant for analysis and remedial design work. Initial findings indicate that both the toe drain system and the reservoir outlet drain need complete replacement, including an increase in outlet drain capacity. Because a dam failure could result in significant property damage and possibly loss of life, the dam is classified as high hazard. These upgrades are intended to bring the dam up to or above current safety standards and ultimately lift the current storage restriction. (In Progress - Previously Action # Jefferson County 38)
    - Priority: Medium
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Bergen Ditch and Reservoir Company; Colorado Dam Safety, Jefferson County Parks & Open Space
    - Relevant Goal(s): 2
    - Timeframe: 2029

    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program
- JC5 | South Weir Gulch remediation. | This project involves constructing a combination of channel enhancements and drop structures designed to address severe erosion and effectively manage runoff from Union Boulevard eastward to Pierson Street, south of Florida Avenue. The affected section of the South Weir Gulch drainageway features steep gradients and significant channel erosion, resulting in nearly vertical walls reaching depths of 15–20 feet. Erosion has extended to the rear yard fences of nearby residences. The anticipated benefits include reduced erosion, improved long-term stream water quality, decreased property loss within the area, and mitigation of existing safety hazards. (No Progress – Previously Action # Jefferson County 11)
    - Priority: Low
    - Local Govt. Lead: Transportation and Engineering Director
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), Mile High Flood District, City of Lakewood
    - Relevant Goal(s): 2
    - Timeframe: 2027
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)

1.3.2 Drought

- JC8 | Habitat restoration. | Stronger ecosystems are more resilient to catastrophic events such as flooding, fire, and erosion, so restoring our land is essential for preserving natural aesthetics, restoring wildlife habitat, and improving water quality. Ongoing action. (Previously Action # Jefferson County 19)
    - Priority: Medium
    - Local Govt. Lead: Parks & Open Space Director
    - Partnering Org(s): Jefferson County Wildland Fire Management
    - Relevant Goal(s): 2
    - Timeframe: 2031

    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Colorado Water Conservation Board (CWCB) – Water Plan Grants
- JC7 | Irrigation management and drought resilience policy. | Jefferson County will develop an irrigation plan and drought policy in coordination with the Climate Resiliency Group and local water providers to promote sustainable water use and strengthen drought preparedness.
    - Priority: Low
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Colorado State University Extension Office, Denver Water, Evergreen Metropolitan District, Genesee Water & Sanitation, Jefferson Conservation District, Jefferson County Planning & Zoning, Lookout Mountain Water District, Mile High Flood District (MHFD), and other water provider partners, municipalities, and community partners
    - Relevant Goal(s): 2, 3
    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Colorado Water Conservation Board (CWCB) – Water Plan Grants
- JC6 | Drought-resilient landscaping. | Jefferson County will promote the use of drought-resistant plant species and implement xeriscaping around county-owned buildings and parks to reduce water demand and conserve resources.
    - Priority: Low
    - Local Govt. Lead: Parks & Open Space Director
    - Partnering Org(s): Jefferson County Facilities Management, Jefferson County Wildland Fire Management
    - Relevant Goal(s): 2
    - Timeframe: 2030
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), U.S. Bureau of Reclamation – WaterSMART Grants

1.3.3 Earthquake

- JC10 | Develop partnerships and begin needs assessment for seismic mitigation of critical infrastructure within Jefferson County. | The Golden Fault and other seismic sources in the region represent a low-probability but high-impact earthquake risk. This project will commence with a comprehensive needs assessment to identify critical facilities susceptible to significant ground shaking that may result in both nonstructural and structural damage. Facilities selected for additional evaluation will undergo a FEMA rapid visual assessment (FEMA 154) to determine building hazards and potential mitigation strategies. Although the likelihood of an earthquake in this area is low, the consequences could be severe. Implementing seismic mitigation measures will help maintain continuous governmental operations for essential infrastructure. This initiative marks the initial step toward reducing earthquake losses, including minimizing the risk of injuries, facility damage, and loss of function. (In Progress - Previously Action # Jefferson County 7)
    - Priority: Low
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), Colorado Geological Survey (CGS)
    - Relevant Goal(s): 1
    - Timeframe: 2028
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC9 | Earthquake awareness and community education. | Jefferson County will provide educational materials on earthquake risks, preparedness measures, and safety protocols, through preparedness publications, informational guides via community outreach events, and county social media. (Ongoing action – Previously Action # Jefferson County 8)
    - Priority: Low
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Jefferson County Planning & Zoning
    - Relevant Goal(s): 1
    - Timeframe: 2031

- Potential Funding Source(s): Local Funding

1.3.4 Extreme Heat

- JC13 | Hazard education and outreach. | Jefferson County Parks & Open Space Park Rangers and natural resources personnel are responsible for achieving direct, on-site educational engagements with park visitors. These interactions typically include providing information regarding natural hazards such as floods, fires, winter storms, rockfall, heat-related illnesses, and stress in both pets and people, as well as promoting wildlife safety and awareness. (In Progress – Previously Action # Jefferson County 33)
  - Priority: Medium
  - Local Govt. Lead: Parks & Open Space Director
  - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM)
  - Relevant Goal(s): 1, 2
  - Timeframe: 2028
  - Potential Funding Source(s): Local Funding
- JC11 | Public Safety Power Shutoff (PSPS) plan revision for extreme heat events. | Jefferson County Sheriff's Office of Emergency Management will revise its Public Safety Power Shutoff (PSPS) plan to incorporate considerations for extreme heat events, with the goal of reducing the potential for power outages to worsen heat-related health impacts. The updated plan will help ensure that vulnerable populations are considered during PSPS events and that mitigation measures are in place to support community safety during periods of extreme temperatures.
  - Priority: Medium
  - Local Govt. Lead: Emergency Manager
  - Partnering Org(s): Jefferson County Public Health, CORE Electric Cooperative, United Power, Xcel Energy, other utility partners, and community partners
  - Relevant Goal(s): 1, 2
  - Timeframe: 2027
  - Potential Funding Source(s): Local Funding, U.S. Department of Health and Human Services (HHS) – Public Health Emergency Preparedness (PHEP)

- JC12 | Extreme heat public health education and cooling center awareness. | Jefferson County will provide public education on the health risks of extreme heat events, using informational handouts and social media posts for guidance on protective measures and signs of heat-related illness.
    - Priority: Low
    - Local Govt. Lead: Public Health Director
    - Relevant Goal(s): 1, 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding

1.3.5 Flood

- JC15 | Major drainageway culvert improvements with Mile High Flood District. | Several roadway crossings currently have undersized culverts, which are being replaced with larger ones designed to handle 100-year flood flows. This upgrade will help minimize flood damage and improve safety for both emergency vehicles and the public during major flooding events. (In Progress – Previously Action # Jefferson County 1)
    - Priority: High
    - Local Govt. Lead: Transportation and Engineering Director
    - Partnering Org(s): Jefferson County Road & Bridge, Mile High Flood District (MHFD)
    - Relevant Goal(s): 2, 3
    - Timeframe: 2030
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC19 | National Flood Insurance Program (NFIP) and Community Rating System (CRS) participation. | This project supports ongoing involvement in both the NFIP and CRS floodplain management programs, which allows county properties to obtain flood insurance at lower rates. Additionally, floodplain management rules help minimize flood risks for new and rebuilt structures throughout the county. These efforts reduce losses from flooding in new construction and give older properties access to affordable flood insurance, offering protection for existing buildings. (In Progress - Previously Action # Jefferson County 12)
    - Priority: High

    - Local Govt. Lead: Planning & Zoning Director
    - Relevant Goal(s): 2, 3
    - Timeframe: 2027
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC20 | Modernize existing FEMA Zone A floodplains that are outside the MHFD utilizing Lidar. | Approximately 2,000 acres of FEMA Zone A floodplains located outside of the MHFD currently exhibit limited mapping accuracy. The effective boundaries were determined using 10-40 foot contour intervals, which introduce a considerable margin of error. By leveraging available Lidar data, these boundaries can be remapped with enhanced precision. Improved mapping directly supports property owners, first responders, county personnel, and FEMA representatives. (In Progress – Previously Action # Jefferson County 24)
    - Priority: High
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Colorado Water Conservation Board (CWCB), Mile High Flood District (MHFD)
    - Relevant Goal(s): 2, 3
    - Timeframe: 2028
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC24 | Drainage and flood improvements for Leyden Creek at Croke Canal. | During the 2013 Colorado floods, Leyden Creek exceeded its banks, resulting in excess water entering Croke Canal and subsequently flooding residential properties downstream of Indiana Street. The proposed project aims to construct a low-flow channel for Leyden Creek beneath Indiana Street and Croke Canal. Additionally, a spillway will be installed at Croke Canal to prevent overflow from entering the canal. (In Progress - Previously Action # Jefferson County 32)
    - Priority: High
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Jefferson County Transportation, City of Arvada, Mile High Flood District, Colorado Department of Transportation (CDOT)

    - Relevant Goal(s): 2, 3
    - Timeframe: 2028
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC16 | Minor culvert improvements. | Several roadway locations currently have culvert crossings that are either failing or at imminent risk of failure. The planned improvements will help minimize flood-related losses and enhance public safety. (In Progress - Previously Action # Jefferson County 2)
    - Priority: Medium
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Jefferson County Transportation and Engineering, Jefferson County Road & Bridge
    - Relevant Goal(s): 2, 3
    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC17 | Flood education and outreach. | Enhance flood awareness among residents of Jefferson County to safeguard individuals and property. This initiative expands on existing annual floodplain notification activities conducted as part of the county's participation in the Community Rating System (CRS) program. Actions include distributing the MHFD flood awareness brochure to residents located within the floodplain. By improving understanding of the risks and hazards associated with flooding, this project aims to mitigate the impact of flood events on Jefferson County citizens. (In Progress – Previously Action # Jefferson County 9)
    - Priority: Medium
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), Mile High Flood District (MHFD)
    - Relevant Goal(s): 1, 2, 3
    - Timeframe: 2030
    - Potential Funding Source(s): Local Funding

- JC18 | Purchase properties from the Special Flood Hazard Area (SFHA) to reduce flood losses. | Use the MHFD Property Acquisition Reserve, or an equivalent fund, to purchase properties located within the Floodplain Overlay District. For properties outside of the MHFD, seek funding to acquire those within the SFHA, aiming to decrease property damage, injuries, and fatalities caused by flooding. (In Progress -Previously Action # Jefferson County 27)
    - Priority: Medium
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Other Jefferson County divisions/departments, Mile High Flood District (MHFD), Colorado Water Conservation Board (CWCB)
    - Relevant Goal(s): 2, 3
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, Mile High Flood District (MHFD) Property Acquisition Reserve
- JC21 | Update FEMA Zone AE floodplains that are outside of the MHFD. | Revise the studies related to FEMA Zone AE floodplains located outside MHFD, primarily in the mountainous regions of the county. These floodplains cover about 700 acres. The current data relies on studies conducted over 30 years ago, which vary in accuracy. Updating these studies would provide precise mapping for areas that have seen increased development, benefiting citizens, county staff, and FEMA personnel. (In Progress - Previously Action # Jefferson County 25)
    - Priority: Medium
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Other Jefferson County divisions/departments, CWCB
    - Relevant Goal(s): 2, 3
    - Timeframe: 2028
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC22 | Update the South Fork of Deer Creek floodplain. | The South Fork of Deer Creek, located partially within MHFD jurisdiction, has been designated as an area susceptible to flooding. Conducting a

comprehensive study will more accurately delineate the floodplain risks associated with this segment. (In Progress - Previously Action # Jefferson County 26)
    - Priority: Medium
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Colorado Water Conservation Board (CWCB), Mile High Flood District (MHFD)
    - Relevant Goal(s): 2, 3
    - Timeframe: 2028
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC14 | Culvert improvement and drainage enhancement projects. | Jefferson County will implement culvert improvement projects identified in the Capital Improvement Plan to enhance drainage infrastructure and reduce the risk of localized flooding. A link to projects can be found here: https://www.jeffco.us/2850/Public-Improvement-Projects
    - Priority: Low
    - Local Govt. Lead: Transportation and Engineering Director
    - Partnering Org(s): Jefferson County Planning & Zoning, Jefferson County Road & Bridge
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)
- JC23 | Drainage and flood control improvement for Dutch Creek at Yukon Street. | During a 10-year flood, the current corrugated metal culvert is overtopped by 2 feet, and during a 100-year flood, it is overtopped by 3 feet. This level of flooding prevents emergency vehicles and local traffic from using the road during storms. The planned new culvert will be designed to handle a 100-year flood, ensuring vehicle access is maintained. (No Progress - Previously Action # Jefferson County 31)
    - Priority: Low
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Jefferson County Transportation and Engineering, Mile High Flood District (MHFD)

  - Relevant Goal(s): 2, 3
  - Timeframe: 2031
  - Potential Funding Source(s): Local Funding, FEMA Flood Mitigation Assistance (FMA), FEMA Hazard Mitigation Grant Program (HMGP)

1.3.6 Ground Instability Hazards (Erosion/Deposition, Expansive Soils/Heaving Bedrock, Ground Subsidence)

- JC25 | Public right-of-way ground instability. | Jefferson County will document and assess public right-of-way areas in south Jefferson County with known ground stability risks and perform targeted grouting of voids in unstable zones.
  - Priority: Medium
  - Local Govt. Lead: Planning & Zoning Director
  - Partnering Org(s): Colorado Division of Reclamation, Mining, and Safety (DRMS), Jefferson County Road & Bridge
  - Relevant Goal(s): 2, 3
  - Timeframe: 2029
  - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC27 | Bear Creek bank stabilization. | The bank of Bear Creek, located downstream from the Evergreen Lake dam, needs stabilization to help lower flood risk and limit sediment movement and buildup. Several outfalls in this area contribute to increased sediment entering Bear Creek. The main benefits of stabilization efforts include reducing flood risk for Evergreen's historic commercial district, enhancing local fisheries, and decreasing the overall sediment load in Bear Creek. (In Progress - Previously Action # Jefferson County 28)
  - Priority: Medium
  - Local Govt. Lead: Planning & Zoning Director
  - Partnering Org(s): Other Jefferson County divisions/departments, Colorado Water Conservation Board (CWCB), Bear Creek Watershed Association
  - Relevant Goal(s): 2, 3
  - Timeframe: 2030
  - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)

- JC26 | Expansive soil risk. | Jefferson County will provide education and outreach to residents, developers, and planners on the risks of expansive soils via community outreach efforts, social media posts, and informational handouts.
    - Priority: Low
    - Local Govt. Lead: Planning & Zoning Director
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM)
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding

1.3.7 Hail

- JC28 | Solar-powered covered parking. | Jefferson County will install solar-powered covered parking structures, focusing on open space areas in the mountains as well as locations where the county vehicle fleet is stored overnight. With this infrastructure, the county will implement an information program to alert staff when to move or protect county-owned vehicles during extreme weather events.
    - Priority: Low
    - Local Govt. Lead: Fleet Services Manager
    - Partnering Org(s): Jefferson County Facilities Management
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), NOAA/National Weather Service – Weather-Ready Nation Grants

1.3.8 Lightning

- JC29 | WeatherSTEM lightning alert education. | Jefferson County will provide education to residents on the WeatherSTEM system during community outreach events distributing informational handouts and posting on social media about information on how to sign up for alerts to be notified of lightning activity in their area.
    - Priority: Low
    - Local Govt. Lead: Emergency Manager

- Partnering Org(s): Jefferson County Parks & Open Space, National Weather Service Denver/Boulder
- Relevant Goal(s): 1
- Timeframe: 2028
- Potential Funding Source(s): Local Funding, NOAA/National Weather Service – Weather-Ready Nation Grants

1.3.9 Severe Wind

- JC32 | Discovery of a community-wide slash collection center. | This project proposes establishing a community-wide slash collection site to provide residents with accessible, inclusive opportunities for slash disposal and vegetation debris removal. One permanent site has been developed, Tin Cup. By creating a centralized slash collection site, the project will support wildfire risk reduction efforts by decreasing the accumulation of combustible vegetation and promoting defensible space practices across the community. (Ongoing Action- Previously Action # Jefferson County 17)
  - Priority: High
  - Local Govt. Lead: Parks & Open Space Director
  - Partnering Org(s): Jefferson County Road & Bridge, local municipalities, community partners.
  - Relevant Goal(s): 2, 3
  - Timeframe: 2031
  - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC30 | Critical infrastructure generator assessment and implementation. | Jefferson County will conduct a scoping study to identify critical infrastructure that requires backup power via generators. The study will evaluate generator capacity, runtime, and proper installation requirements to ensure they function effectively during emergency events.
  - Priority: Medium
  - Local Govt. Lead: Emergency Manager
  - Partnering Org(s): Jefferson County Facilities Management, municipalities, community partners
  - Relevant Goal(s): 2

    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC31 | Critical infrastructure generator procurement. | Following the generator scoping study, Jefferson County will purchase and deploy backup generators for county-owned critical infrastructure and assist with finding funding sources for other high-priority sites where gaps are identified.
    - Priority: Medium
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Other Jefferson County divisions/departments, municipalities, community partners
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Colorado Energy Office (CEO) – Resilient Energy Programs

1.3.10 Severe Winter Weather (include extreme cold)

- JC33 | Extreme winter weather planning and cold weather sheltering. | Jefferson County will develop a plan for winter weather events and extreme cold weather sheltering. The plan will outline strategies for sheltering operations and potentially deployment of temporary shelter tents.
    - Priority: Medium
    - Local Govt. Lead: Human Services Director
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), Jefferson County Public Health, municipalities, community partners
    - Relevant Goal(s): 2
    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)

1.3.11 Slope Failure Hazards (Landslide, Debris Flow, Rockfall, Avalanche)

- JC35 | Post-wildfire slope stabilization and erosion control. | Jefferson County will implement slope stabilization projects in post-wildfire areas to reduce erosion, prevent debris flows, and minimize damage to infrastructure, waterways, and nearby properties. Projects may include erosion control measures, revegetation, and structural stabilization techniques.
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Planning & Zoning, Jefferson County Parks & Open Space, Jefferson County Road & Bridge, Jefferson County Transportation and Engineering
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), U.S. Geological Survey (USGS) – Landslide and Slope Hazard Programs
- JC34 | Rockfall and landslide hazard mitigation through rock scaling. | Jefferson County will implement rock scaling projects in high-risk rockfall and landslide areas to remove unstable material and reduce the risk to public safety, transportation corridors, and nearby infrastructure. Projects will be prioritized based on hazard assessments and coordinated with geotechnical experts and transportation agencies.
    - Priority: Medium
    - Local Govt. Lead: Road & Bridge Director
    - Relevant Goal(s): 2
    - Timeframe: 2028
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC36 | Education and awareness of geologic hazards. | Because geologic hazards are relatively rare in the planning area, most people are not fully aware of the risks they present. To address this, Jefferson County plans to offer annual education and outreach about expansive soils via social media and informational handouts for residents, developers, and

planners. The county will collaborate with the Colorado Geological Survey to create publicly accessible GIS layers that highlight hazards such as landslides and debris flows, ensuring this information is widely shared. By increasing awareness, individuals can better understand how to respond during an earthquake. Enhanced mapping of debris flow and landslide zones may also support more effective mitigation efforts. (In Progress - Previously Action # Jefferson County 8)

  - Priority: Medium
  - Local Govt. Lead: Planning & Zoning Director
  - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), municipalities, Jefferson County Business Innovation & Technology (BIT)
  - Relevant Goal(s): 1
  - Timeframe: 2029
  - Potential Funding Source(s): Local Funding

- JC37 | Stabilize the landslide near the reinforced soil slope (RSS) at the Rocky Mountain Metropolitan Airport (RMMA). | The RSS was built as part of the safety area at RMMA in 2014. Since then, inclinometers have shown ongoing movement along a failure plane. The base of the slope is close to Colorado Highway 128, so any failure of the RSS could affect this highway. Initial mitigation plans involve installing reinforced concrete piers and tiebacks to stabilize the area. These measures will help ensure continued RMMA operations, enhance public safety, and reduce impacts on the state highway system. While RMMA mostly lies within Jefferson County, the mitigation work will take place in a section located in the City and County of Broomfield. (In Progress – Previously Action # Jefferson County 21)
  - Priority: Medium
  - Local Govt. Lead: Planning & Zoning Director
  - Partnering Org(s): Rocky Mountain Metropolitan Airport, Colorado Department of Transportation (CDOT), Colorado Geological Survey (CGS)
  - Relevant Goal(s): 2
  - Timeframe: 2028

    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC38 | Rockfall hazard advisory and education. | Create and place bilingual signs about rockfall hazards for pedestrians, hikers, and climbers at main park sites. (In Progress - Previously Action # Jefferson County 34)
    - Priority: Low
    - Local Govt. Lead: Parks & Open Space Director
    - Partnering Org(s): Friends of Dinosaur Ridge
    - Relevant Goal(s): 1, 2
    - Timeframe: 2027
    - Potential Funding Source(s): Local Funding

1.3.12 Tornado

- JC39 | Community tornado education. | Jefferson County will develop and distribute public outreach and educational materials, identifying the types of locations that residents and tourists can utilize during emergency events. Materials may include printed guides, signage, online maps, QR codes, and integration with visitor information platforms.
    - Priority: Low
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Jefferson County Parks & Open Space, fire protection districts, municipalities, and community partners
    - Relevant Goal(s): 1, 2
    - Timeframe: 2030
    - Potential Funding Source(s): Local Funding

1.3.13 Wildfire

- JC40 | Redundant emergency communications for wildfire resilience. | Jefferson County will establish redundant communication systems to ensure continuity of emergency communications in the event that wildfire damages primary infrastructure. This may include backup radio systems, satellite communications, mobile communication units, and power redundancy.
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Fire protection districts, municipalities

    - Relevant Goal(s): 2, 3
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC41 | Evacuation annex public education and risk-based updates. | Jefferson County will educate the public on the evacuation annex, procedures, and expectations during emergencies. The county will also review and update the annex using new and improved wildfire risk data to refine evacuation planning.
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Fire protection districts, municipal law enforcement agencies, Jefferson County Sheriff's Office of Emergency Management (OEM)
    - Relevant Goal(s): 1, 2
    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC42 | Fuel reduction projects for wildfire risk reduction. | Jefferson County will implement fuel reduction projects around residential areas and critical infrastructure located in high-risk wildfire zones. These projects will reduce hazardous vegetation, create defensible space, and lower the likelihood and intensity of wildfire impacts. Efforts will be prioritized based on wildfire risk assessments and coordinated with property owners, fire protection districts, and land management partners.
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Fire protection districts
    - Relevant Goal(s): 2
    - Timeframe: 2030
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), USDA Forest Service – Community Wildfire Defense Grant (CWDG), Colorado Division of Forestry – Wildfire Risk Reduction Grant

- JC43 | Exterior fire suppression systems for critical infrastructure. | Jefferson County will assist in seeking grants and funding opportunities for exterior fire suppression systems at critical infrastructure sites in wildfire-prone areas. These systems may include rooftop and perimeter sprinklers and on-site water supplies to reduce structure ignition and wildfire impacts. The county will prioritize essential facilities to improve resilience and maintain continuity of critical services during wildfire events.
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), fire protection districts
    - Relevant Goal(s): 2
    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC45 | Mitigate wildfire hazards on public lands and open space properties. | Fuel load issues exist on county and other open space lands, creating potential risks for residential and other developments. The planned projects will mitigate hazardous fuels in areas marked as high-risk by both countywide and individual agency CWPPs. Mitigation approaches may feature tree thinning, mastication, or controlled burning. The main benefit is reduced wildfire damage. (Ongoing - Previously Action # Jefferson County 6)
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Parks & Open Space, fire protection districts, United States Forest Service (USFS), Denver Mountain Parks, municipalities, community partners
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Community Wildfire Defense Grant Program (CWDG)

- JC46 | Fuel break thinning in right-of-way along evacuation routes within the Wildfire Urban Interface. | The project aims to locate spots in Jefferson County and state right-of-way along evacuation routes in the Wildfire Urban Interface where forest growth has begun to invade public streets and roads. After these areas are identified, fuel breaks will be created, and debris will be cleared where mitigation is needed. These actions help ensure safer movement for both residents and first responders during emergencies. (Ongoing - Previously Action # Jefferson County 20)
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Sheriff's Office, Jefferson County Road & Bridge, Colorado State Forest Service (CSFS), Colorado Department of Transportation (DOT), fire protection districts, municipal law enforcement agencies, community partners, Coalition for the Upper South Platte
    - Relevant Goal(s): 2, 3
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Community Wildfire Defense Grant Program (CWDG)
- JC47 | County road clear zone fund. | The County manages hundreds of miles of mountain roads that serve as vital evacuation routes. Many were built long ago with narrow rights-of-way. This project aims to create clear zones by removing roadside trees and other obstacles, reducing the risk of blocked roads during hazards such as storms or wildfires. The first phase involves identifying the most critical, constrained roads and determining adjacent land ownership, requiring property records research. The project will also fund easement purchases and the actual clearing work, improving the likelihood that evacuation routes remain open during emergencies. (In-Progress – Previously Action # Jefferson County 23)
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager

    - Partnering Org(s): Jefferson County Sheriff's Office, Jefferson County Transportation and Engineering, Jefferson County Road & Bridge, Sheriff, Colorado Department of Transportation (CDOT), fire protection districts, Jefferson County Assessor's Office
    - Relevant Goal(s): 2
    - Timeframe: 2030
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Community Wildfire Defense Grant Program (CWDG)
- JC48 | Perform hazard fuel mitigation in areas identified as high hazard in countywide and individual CWPPs. | This project focuses on hazard fuel mitigation in locations identified as high-risk through countywide and individual CWPPs. Techniques such as tree thinning, mastication, and controlled burns may be used. The CWPP will guide specific treatments for each area. Fuel mitigation offers public safety improvements, lowers firefighter risks, diminishes potential structural losses, and aids forest health. (Ongoing - Previously Action # Jefferson County 10)
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Sheriff's Office, fire protection districts, Jefferson Conservation District
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), USDA Forest Service – Community Wildfire Defense Grant (CWDG), Colorado Division of Forestry – Wildfire Risk Reduction Grant
- JC50 | Forest health. | Update the Jefferson County Parks & Open Space Forest Health Plan and reduce tree density and fuel sources on 1,000 of our 17,000 acres of forested lands. (Ongoing - Previously Action # Jefferson County 18)
    - Priority: High
    - Local Govt. Lead: Parks & Open Space Director
    - Partnering Org(s): Jefferson County Wildland Fire Management, Colorado Forest Restoration Institute, Forest Stewards Guild

    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Community Wildfire Defense Grant Program (CWDG)
- JC51 | Defensible space and structure hardening mitigation grant fund. | Current regulations are designed to ensure defensible space around newly constructed buildings. The building code mandates the use of fire-resistant materials in new homes and additions. However, these rules do not require homeowners to establish defensible space or upgrade older structures. A mitigation grant fund could help finance improvements that reduce wildfire risk in existing developments by making it more affordable and appealing to install defensible space and fire-resistant materials. This program would also serve as an educational resource for mountain area residents, helping them understand wildfire risks and effective mitigation strategies. (In-Progress - Previously Action # Jefferson County 22)
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): fire protection districts, realtors and insurance agencies
    - Relevant Goal(s): 2
    - Timeframe: 2029
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Community Wildfire Defense Grant Program (CWDG)
- JC55 | Bilingual wildfire publications. | Census data indicate that Jefferson County residents speak a variety of languages. To address this need, the county will develop and translate preparedness materials, including guides, pamphlets, and informational handouts, beginning with Spanish. Additional language priorities will be identified through analysis of Census data and input from the Access and Functional Needs Advisory Committee. The objective is to ensure that bilingual residents and visitors have equitable access to resources that support preparedness for potential hazards. (In Progress - Previously Action # Jefferson County 14)

    - Priority: High
    - Local Govt. Lead: Emergency Manager
    - Partnering Org(s): Jefferson County Wildland Fire Management, fire protection districts, other Jefferson County divisions/departments
    - Relevant Goal(s): 1, 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Emergency Management Performance Grant (EMPG)
- JC54 | Implement residential wildfire mitigation program. | Allocate approximately $500,000 to enable fire districts to expand home assessments aimed at wildfire risk reduction. Establish a certification program for defensible space home assessments and provide educational resources for HOAs and homeowners. (Ongoing – Previously Action # Jefferson County 37)
    - Priority: High
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Wildfire Commission, fire protection districts, homeowner associations (HOAs)
    - Relevant Goal(s): 1, 2, 3
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Community Wildfire Defense Grant Program (CWDG)
- JC44 | Update CWPPs to reflect changing conditions and new development. | This project aims to update Community Wildfire Protection Plans (CWPPs) to incorporate recent developments and evolving conditions. Since most CWPPs were originally developed in 2010, existing data may no longer be accurate due to subsequent changes and growth. The implementation process will likely involve engaging a qualified consulting firm to collect current data and develop revised plans. Enhanced data quality will support more effective mitigation strategies, improved planning, and a stronger overall response. (Ongoing - Previously Action # Jefferson County 5)
    - Priority: Medium

    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Fire protection districts
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP), Community Wildfire Defense Grant Program (CWDG)
- JC49 | Geographic Information System layer updates. | A significant portion of Jefferson County falls within the Wildland Urban Interface (WUI). Due to the diversity of land ownership in the county, creating GIS layers for wildfire risk and fire management (fuels reduction) projects has posed challenges. The availability of these GIS layers will support wildfire response, assist in planning future fuels reduction initiatives, and facilitate the maintenance and reassessment of previously completed projects. (In Progress - Previously Action # Jefferson County 16)
    - Priority: Medium
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), Jefferson County Business Innovation & Technology (BIT)
    - Relevant Goal(s): 2
    - Timeframe: 2027
    - Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)
- JC52 | 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. 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: 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. (Ongoing - Previously Action # Jefferson County 35)
    - Priority: Medium
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Jefferson County Parks & Open Space, Jefferson County Business Innovation & Technology (BIT), Jefferson County Wildfire Commission, fire protection districts, Jeffcom 911, municipalities, partner agencies, homeowner associations (HOAs)
    - Relevant Goal(s): 2
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding
- JC53 | Create, brand, maintain, and promote a one-stop webpage on reducing wildfire risk in Jefferson County. | The webpage will cover wildfire mitigation and preparedness. (Ongoing - Previously Action # Jefferson County 36)
    - Priority: Medium
    - Local Govt. Lead: Wildland Fire Program Manager
    - Partnering Org(s): Other Jefferson County divisions/departments, fire protection districts, Jefferson County Wildfire Commission, Colorado State University (CSU) Extension Office, Colorado State Forest Service (CSFS)
    - Relevant Goal(s): 1, 2, 3
    - Timeframe: 2031
    - Potential Funding Source(s): Local Funding

1.3.14 Cyber Attack

- JC56 | Implementation of County Cybersecurity Plan projects. | Jefferson County will implement priority projects identified in the county cybersecurity plan to reduce cyber risk and improve the resilience of county systems and critical services.
    - Priority: Medium
    - Local Govt. Lead: Chief Information Officer
    - Partnering Org(s): Jefferson County Sheriff's Office of Emergency Management (OEM), Other Jefferson County divisions/departments
    - Relevant Goal(s): 2
    - Timeframe: 2031

- Potential Funding Source(s): Local Funding, FEMA Hazard Mitigation Grant Program (HMGP)

1.3.15 Pandemic

- JC57 | Pandemic response coordination with CDC guidance. | Jefferson County Public Health will follow Centers for Disease Control and Prevention (CDC) protocols and guidance as pandemic events occur to protect public health, maintain essential services, and support coordinated response efforts.
  - Priority: Medium
  - Local Govt. Lead: Public Health Director
  - Partnering Org(s): Other Jefferson County divisions/departments
  - Relevant Goal(s): 2
  - Timeframe: 2031
  - Potential Funding Source(s): Local Funding

1.4 Mitigation Capabilities

The mitigation capability assessment evaluates Jefferson County's ability to implement and manage the comprehensive mitigation strategy outlined in this HMP. It identifies each participating local government's strengths, weaknesses, and resources to ensure effective and appropriate management of the county's hazard mitigation program. Refer to the HMP annexes for each local government's updated capability assessment. Note that the capability assessment asked different questions depending on the type of local government, as some do not apply to special districts and, therefore, are not assessed.

Mitigation capabilities are classified into the following types:

- Planning & Regulatory
  - Plans
  - Building Code, Permitting, & Inspection
  - Land Use Planning & Ordinances
- Administrative & Technical
  - Administration
  - Staff
  - Technical
- Financial

    - Funding Resources
- Education & Outreach
    - Programs & Organizations

1.4.1 Planning and Regulatory Capabilities

Planning and regulatory capabilities are powerful tools for implementing hazard mitigation. The county currently has many of these capabilities shown in the lists below.

1.4.1.1 Capabilities In Place

- Comprehensive, Master, or General Plan
    - A new Comprehensive Plan (formerly known as the Comprehensive Master Plan) was adopted by the Jefferson County Planning Commission on April 8, 2026.
- Capital Improvement Program or Plan (CIP)
- Hazard-Specific Plan (Floodplain, Steep Slope, Wildfire)
    - Floodplain Management Plan
    - Floodplain Overlay District
- Stormwater Management Plan
    - Zoning Resolution Section 16 - Land Disturbance
- Community Wildfire Protection Plan (CWPP)
    - Adopted by the Jefferson County Board of County Commissioners (BCC) on October 23, 2024
- Erosion / Sediment Control Program
    - Section 16 & MS4 Permit (5 year permit from CDPHE)
- Local Emergency Operations Plan
    - Comprehensive Emergency Management Plan (CEMP) - readoption by BCC on November 4, 2025
- Transportation Plan
    - Transportation and Mobility Plan adopted by the BCC on September 24, 2025
- Land Use Plan
    - Contained in the Comprehensive Plan
    - Currently updating the Universal Land Use Code (To be in effect in July 2026). These efforts include incorporating the State of Colorado's Wildfire Resiliency Code.

    - Planning & Zoning also has Area Plans covering 8 different geographic regions (2026-2034)
- Continuity of Operations Plan (COOP)
    - Purchased Veoci Continuity Program Administration software. Held kickoff meetings with department heads May/June 2025 and will switch from Bold Planning.
- Building Codes
    - 2018 IBC
- Building Code Effectiveness Grading Schedule (BCEGS) Rating
    - 4 (residential) / 3 (commercial)
- Site Plan Review Requirements
    - Zoning Resolution, Land Development Regulation & Building Codes
- Zoning Ordinance
    - Zoning Resolution
    - Zoning ordinance & subdivision ordinances are being combined into one document, the Unified Land Use Code, which is currently being developed.
- Subdivision Ordinance
    - Land Development Regulation
- National Flood Insurance Program (NFIP) Participant
- Flood Insurance Study
- Floodplain Ordinance
- Flood Insurance Rate Maps
- Elevation Certificates for Floodplain Development
- Community Rating System (CRS) Participant
    - Class 5
- Open Space / Conservation Program
    - Forest Management Plan - Conservation Green Print (2026-2030)
    - Forest Health Plan (2022)
- Stormwater Program or Ordinance
- Natural Hazard-Specific Ordinance (stormwater, steep slope, wildfire)
    - Update to WUI Code, Wildfire Hazard Overlay District Zoning Resolution; Geologic and Geotechnical Regulations

1.4.1.2 Capabilities Not In Place

- Economic Development Plan

- Growth Management Ordinance

1.4.2 Administrative and Technical Capabilities

Administrative and technical capabilities include staff, working groups, and technology, which are vital for a community to implement hazard mitigation. The county currently has staffing and resources for many of these capabilities, as shown in the lists below.

1.4.2.1 Capabilities In Place

- Planning Commission
- Emergency Manager
- Full-Time Building Official
- Floodplain Administrator
- Community Planner
- Transportation Planner
- Civil Engineer
- GIS Coordinator
- GIS Analyst
- Resiliency Planner
- Planner/Engineer (Land Development)
- Engineer/Professional (Construction)
- Planner/Engineer/Scientist (Natural Hazards)
- Grant Manager, Writer, or Specialist
- Other Relevant Staff
    - Sustainability Coordinator; Operations Coordinator; Forester
- Mutual Aid Agreements
- Hazard Data and Information
    - Simtable purchased in 2024. The county has mapped designated floodplains, geologic hazard areas, rockfall and mining zones, and CWPP wildfire risk data.
- Warning Systems / Services (General – All Hazard)
    - Lookout Alert

1.4.3 Financial Capabilities

A community's ability to implement a comprehensive mitigation strategy depends on available funding. The county currently utilizes many of the fiscal tools shown in the lists below.

1.4.3.1 Capabilities In Place

- Authority to levy taxes for Specific Purposes with Voter Approval
- System Development / Impact Development Fee
  - Traffic Impact fees / Park & School Fees
- General Obligation Bonds to Incur Debt
- Special Tax Bonds to Incur Debt
  - South Jeffco Local Improvement District
- State funding programs
  - Colorado Strategic Wildfire Action Program (COSWAP), Forest Restoration and Wildfire Risk Mitigation (FRWRM)
- Capital Improvement Project Funding
- Community Development Block Grants (CDBG)
- Federal funding programs (non-FEMA)
  - HOME funding

1.4.3.2 Capabilities Not In Place

- Utilities Fees
- Withheld Spending in Hazard-Prone Areas
- Stormwater Service Fees
- Stormwater Utility Fees

1.4.4 Education and Outreach Capabilities

Education and outreach are essential capabilities that allow a community to continue the conversation with the public about hazard risks and mitigation opportunities. The county currently utilizes many of these capabilities shown in the lists below.

1.4.4.1 Capabilities In Place

- Community newsletters
  - EngageJeffCo
- Hazard awareness campaigns (i.e., Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)
  - West Metro Fire Muster
  - Storm Ready
  - National Preparedness Month
  - Be Your Own Hero

    - Hazel the Hedgehog
    - Jeffco Public Schools Career Fair
- Local news
- Local Citizen Groups That Communicate Hazard Risks
    - Colorado 911 Resource Center
    - Jefferson County Wildland Fire Management Mitigation Working Group
    - Upper South Platte Partnership subgroup
    - Quarterly Conifer Area Council Meetings
    - Conifer Wildfire Ready (through Rotary)
- Social media
    - Jeffcom911 uses X, Facebook, Instagram, LinkedIn, NextDoor

1.4.5 Capabilities to Add/Enhance

Jefferson County utilized this assessment to identify capabilities they want to expand and enhance to improve mitigation strategy implementation. A government's ability to do so depends on its elected leadership, management, and available funding and staffing. Grant opportunities are also identified to help improve these capabilities.

The county seeks to strengthen its funding capabilities by leveraging grant opportunities and expanding staff resources to effectively manage and implement mitigation projects.

1.5 Compliance with Floodplain Requirements

The National Flood Insurance Program (NFIP) offers federally supported flood insurance to homeowners, renters, and business owners in participating communities. The Flood Insurance Rate Map (FIRM) is the main tool for determining flood hazard extent and location, showing base flood elevations and the boundaries of the 100- and 500-year floodplains. FIRMs provide detailed and consistent data and serve as the minimum oversight area under the floodplain management program for many communities.

Participants in the NFIP are required to, at a minimum, regulate development in floodplain areas following NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure the following requirements are met.

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.

The NFIP looks to reduce flood risk after a flood event. It does this through substantial damage/substantial improvement rules. These rules apply when a structure is more than 50% damaged or improved (by cost). The owner must build in a way that complies with current building codes and ordinances by going through the floodplain application and permit process. This applies even if the structure was exempt from those rules before the damage or improvement. It also applies to damage from non-flood events, such as fire or wind. Substantial damage or substantial improvement allows communities to require owners of structures built before they joined the NFIP to comply with current standards. Communities are responsible for making substantial damage or substantial improvement determinations and notifying property owners.

Jefferson County, the City of Arvada, the City of Edgewater, the City of Golden, the City of Lakewood, the Town of Morrison, and the City of Wheat Ridge participate in the NFIP program. The county and participating communities are currently in good standing with the provisions of the NFIP and will continue compliance, monitored by FEMA regional staff. Maintaining compliance under the NFIP is an essential component of flood risk reduction.

The county's current FIRM effective date is August 2, 2022. The county and participating communities are currently in good standing with the provisions of the NFIP and will continue compliance, monitored by FEMA regional staff. Maintaining compliance under the NFIP is an essential component of flood risk reduction.

As of August 31, 2025, 1,595 policies are currently in force in the county, with coverage of $471,400,000. Most policies are in the City of Arvada, followed by the county. As of July 31, 2025, 184 claims have been made and paid, totaling $603,571 in payments, including building and content values. Of these claims, 61 were in unincorporated areas, totaling $254,177 in payments.

Jefferson County also participates in the Community Rating System (CRS). As of September 2025, the county is a Class 5 community.

The following list details the current policy coverage for the county. Refer to the local government annexes for current policy coverage for the participating local governments.

- Date of Entry: August 5, 1986
- Initial Flood Hazard Boundary Map (FHBM) Identified: November 22, 1974
- Initial FIRM Identified: August 5, 1986
- Policies in Force: 405
- Total Coverage: $120,584,000

Of these 1,595 total policies, 405 are in force in the unincorporated county, including $120,584,000 in total coverage. The unincorporated county has three repetitive loss (RL) properties and no severe repetitive loss (SRL) properties. Two of the RL properties are 'single family' and the other is considered 'other residential'.

Adopting floodplain management rules is only effective if the rules are followed and enforced. Implementation and enforcement of local floodplain regulations (i.e., "compliance") is achieved through the following:

- Continuing to participate in FIRM updates and adopt floodplain maps when created/updated
- Implementing, maintaining, and updating floodplain ordinances
- Continued designation of a local floodplain manager whose responsibilities include reviewing floodplain development permits to ensure compliance with local floodplain management ordinances and rules
- Suggest improvements to the enforcement of, and compliance with, regulations and programs
- Promote and educate the public on the benefits of flood insurance

The county's NFIP compliance is implemented through the following designation. Refer to the HMP annexes for their specific designations for implementing floodplain management ordinances.

- The County Director of Planning and Zoning has been appointed as the Floodplain Administrator to implement and enforce the provisions of Section 37 Floodplain Overlay District of the County Zoning Code and other appropriate Sections of 44 CFR (National Flood Insurance Program regulations) pertaining to floodplain management.

1.6 Plan Monitoring and Maintenance

Jefferson County and the Planning Team have agreed upon the following HMP maintenance procedures. During the 2025-2026 planning process, it was determined that the county Emergency Management Supervisor would serve as the primary point of contact for these maintenance tasks. This individual will coordinate all local efforts to monitor, assess, and update the HMP Base Plan. Each participating local government will be responsible for updating their annex, implementing its specific mitigation actions and reporting on its status, and providing annex updates to the Emergency Management Supervisor.

Throughout the year, the county Emergency Management Supervisor will monitor events that may require the Planning Team to revisit sections of the HMP. Reasons for this revisitation may include, but are not limited to, disaster events (impacting the county or other communities nationwide), changes in hazard risk or vulnerability due to population change, development, climate change impacts, changes in available funding resources, updated hazard studies or information, changes in governmental organizational structure, or public input/concerns.

The county Emergency Management Supervisor will track hazard events in the county, and similarly, each local government will track events within their boundaries that do not require an immediate update to the HMP for integration into the five-year update.

Annually, during the fourth quarter, the Emergency Management Supervisor will request status updates from all Planning Team members on the mitigation actions identified in this HMP. The responses will be compiled into a report and provided to the governing bodies of each local government. After reviewing the progress report, the governing bodies or the Planning Team may request a follow-up with the organization responsible for implementing an action to discuss project conditions. The HMP's effectiveness will be evaluated directly from these annual progress reports.

Starting in the third year of the HMP's five-year lifespan, the Jefferson County Sheriff's Office of Emergency Management will begin efforts to secure funding and resources for the next update process. At this time, it will be determined who will lead this effort and if outside organizations or consultants will be utilized.

1.7 Planning Integration

Integrating the HMP into other planning mechanisms is crucial for effectively implementing the mitigation strategy. This also benefits communities by preventing conflicts among planning documents. The county integrated the 2022 HMP into multiple grant applications, incorporated the risk profile into the Comprehensive Emergency Management Plan, and referenced it in other key documents, including the 2024 Jefferson County Community Wildfire Protection Plan (CWPP), the Parks and Open Space Plan, and the Forest Health Plan. The 2022 HMP is frequently referenced and used as technical guidance in the county's comprehensive planning efforts. The updated county Comprehensive Plan outlines specific goals and policies for wildfire and hazard mitigation, serving as a framework for future land use and development. Refer to the HMP annexes to see how the participating local governments incorporated the 2022 HMP into their local planning.

The county's planned integration efforts for the 2026 HMP include future updates to the evacuation plan. Additionally, the HMP will be referenced as the county transitions from its Comprehensive Emergency Management Plan to an Emergency Operations Plan (currently in progress). It will also be utilized when developing future grant applications. Refer to the HMP annexes to see how the participating local governments plan to incorporate the 2026 HMP into their local planning mechanisms.

1.8 Continued Public Engagement

Ongoing public engagement over the next five years is vital for maintaining community support for the mitigation strategy. Jefferson County will maintain ongoing public engagement relating to hazard mitigation by collaborating annually with our partner agencies on educational initiatives. Examples include the county's coordination with West Metro Fire to support school events across the district each Fall (Fire Muster), school district career days, and community events such as the Arvada Kite Festival. During these events, informational handouts, preparedness publications, and information about signing up for Lookout Alert will be distributed to enhance community awareness and preparedness.

The Office of Emergency Management also plans to increase postings relating to preparedness and awareness information on the county's social media platforms

The county will also work alongside departments and partner agencies to provide educational resources to both internal staff and the wider community. Additionally, annual virtual surveys administered by Public Affairs will be used to ensure continued community involvement regarding the county's hazards.

In addition, the adopted HMP will be posted on the Jefferson County Sheriff's Office and Jefferson County websites and made available for review and download. The **2026 Mitigation Actions** also include several mitigation actions (JC3, JC9, JC12, JC13, JC17, JC29, JC36, JC38, JC39, JC41, JC55) related to providing public education on various natural hazards.

Refer to the HMP annexes for local planning engagement activities.

1.9 Changes in Community Priorities

Communities evolve throughout the HMP's five-year span. This can result in shifts in government priorities related to hazard mitigation. Factors that could impact these priorities include recent disaster events; changes in local resources, needs, or capabilities; new state or federal policies and funding resources; newly identified hazard impacts from updated risk assessments; or changes in growth and development. Conversely, some communities may not have experienced significant changes that would affect the updated HMP. For updates on each local government's priorities, see the local government annexes.

The recent Quarry Fire, in addition to the Marshall Fire in neighboring Boulder County, highlighted the vulnerability of all communities within the county to wildfires, increasing awareness among both urban and mountain residents. Consequently, there has been increased emphasis on implementing additional fuel-reduction projects to mitigate this risk in Jefferson County.

2 Planning Process

2.1 Background

The 2026 Jefferson County Hazard Mitigation Plan (HMP) is an updated version of the 2022 plan. This plan aims to lessen the impact of hazards on Jefferson County communities through pre-disaster planning. It must be updated and approved by the Federal Emergency Management Agency (FEMA) every five years to remain current and qualify for FEMA Hazard Mitigation Assistance (HMA) Program Grants.

The 2026 HMP has been prepared to meet the requirements set forth by FEMA and the Colorado Division of Homeland Security and Emergency Management (DHSEM), making Jefferson County eligible for funding and technical assistance from state and federal hazard mitigation programs. This HMP will be updated and FEMA-approved within its five-year expiration date.

This HMP has been adopted by Jefferson County and its participating local governments, as authorized by the State of Colorado. This HMP was developed following current state and federal rules and regulations governing local HMPs and shall be monitored and updated on a routine basis to maintain compliance with the following legislation and guidance:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C., Section 322, Mitigation Planning, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390) and by FEMA's Interim Final Rule published in the Federal Register on February 26, 2002, at 44 CFR Part 201

The following FEMA guides and reference documents were used to prepare this document:

- FEMA. Local Mitigation Planning Policy Guide. April 11, 2025
- FEMA. Local Mitigation Planning Handbook. June 2025

2.2 Update Process and Methodology

The planning process included meetings and workshops with the Planning Team, public engagement efforts, and an updated risk assessment. This process resulted in a revised mitigation strategy for Jefferson County and its local governments to

implement over the next five years. A high-level overview of the components that contributed to the updated HMP is shown in **FIGURE 3**.

Figure 3 Hazard Mitigation Plan Components

2.2.1 Participating Local Governments

The Jefferson County Emergency Management Supervisor invited all local governments in Jefferson County to participate in the planning process via email, one-on-one conversations, and during other community meetings. They were informed of the participation requirements and the formation of the Planning Team. **TABLE 1** shows the participating local governments who were formal participants in the planning process and have formally adopted this Plan. New participants to the hazard mitigation plan update are identified with an asterisk (*).

Participation in the planning process was closely tracked to ensure all entities remained engaged across the planning process. **TABLE 1** shows organizational participation in Planning Team meetings and workshops, as well as in non-HMP meetings where the HMP was discussed. Additional individual one-on-one discussions, emails, and meetings were also utilized as needed throughout the process. Event agendas can be found in the **HMP APPENDICES.**

Table 1 Local Government Participation Tracker

Planning Partner	Pre-Kickoff	Kickoff Workshop	Risk Assessment Workshop	Individual Coordination Meetings	Mitigation Strategy Workshop
Jefferson County	●	●	●	●	●
Arvada FPD		●	●	●	●
City of Arvada		●	●	●	●
City of Edgewater				●	
City of Golden		●	●	●	●
City of Lakewood		●	●	●	●
City of Wheat Ridge			●	●	●
Conifer Fire* (Formerly North Fork FPD, and Inter-Canyon FPD)		●	●	●	
Denver Water		●	●	●	●
Elk Creek FPD			●	●	
Evergreen FPD		●	●	●	●
Evergreen Metro District*			●	●	●
Foothills FPD				●	
Genesee FPD		●		●	

Planning Partner	Pre-Kickoff	Kickoff Workshop	Risk Assessment Workshop	Individual Coordination Meetings	Mitigation Strategy Workshop
Genesee Water & Sanitation District*		●	●	●	
Golden Gate FPD				●	
Indian Hills FPD		●	●	●	●
Jefferson Conservation District		●		●	●
Lookout Mountain Water District		●	●	●	●
Mile High Flood District*				●	
Town of Morrison		●		●	
West Metro FPD			●	●	●

The complete Planning Team roster is included in the **HMP APPENDICES**. The roster also indicates those who attended Planning Team events and the community sectors each individual represents. A summary of the sectors that the county invited to participate in the planning process is shown in **FIGURE 4**.

Figure 4 Planning Team Sectors

2.2.2 Stakeholders

Several other stakeholders were involved in the HMP update, in addition to the Planning Team, including representatives from all local governments across the county. Stakeholders invited to participate and contribute to the HMP update included the following:

- Adams County
- American Red Cross
- Arapahoe County
- Atlantis Community, Inc.
- Bear Creek Watershed Association
- Boulder County
- City and County of Broomfield
- City and County of Denver

- City of Littleton
- City of Westminster
- Clear Creek County
- Colorado Department of Transportation
- Colorado Division of Fire Protection and Control
- Colorado Division of Homeland Security and Emergency Management (CO DHSEM)
- CO DHSEM Access and Functional Needs (AFN) Program
- Colorado Office of Dam Safety
- Colorado Division of Water Resources
- Colorado Parks & Wildlife
- Colorado School of Mines
- Coors Brewing Company
- Douglas County
- FEMA Region 8
- Gilpin County
- Intermountain Health
- JeffCo Public Schools
- Lockheed Martin
- National Laboratory of the Rockies (NLR)
- Park County
- Pleasant View Fire Department
- Pleasant View Water and Sanitation District
- Red Rocks Community College
- Regional Transportation District (RTD)
- Rocky Mountain Metropolitan Airport
- South Metro Fire Rescue
- St Anthony's Hospital
- Town of Bow Mar
- Town of Mountain View
- Town of Superior
- U.S. Forest Service
- University of Colorado Denver School of Medicine
- Xcel Energy

2.2.3 Incorporation of Existing Plans and Information

In addition to the data provided by stakeholders mentioned earlier, all relevant plans, studies, reports, and technical information related to HMP were reviewed during the update. The following list summarizes how these resources were integrated into the 2026 HMP.

- These plans helped to inform the hazard profiles and mitigation strategy.
  - Jefferson County CWPP (2024)
  - Arvada Fire and City of Arvada CWPP (2026)
  - City of Golden CWPP (2021)
  - Coal Creek Canyon FPD CWPP (2024)
  - Elk Creek and Inter-Canyon FPDs CWPP (2021)
  - Evergreen FPD CWPP (2025)
  - Genesee FPD CWPP (2021)
  - West Metro FPD CWPP (2021)
  - City of Lakewood Climate Hazard and Social Vulnerability Study (2025)
  - Colorado E-SHMP (2023)
  - High Hazard Potential Dam Emergency Action Plans (multiple)
  - Jefferson County Comprehensive Plan (2026)
  - Jefferson County Climate Action Plan (2022)
- These plans helped to inform the mitigation strategy.
  - Jefferson County Open Space Forest Health Plan (2022)
  - Increasing Wildfire Resilience Through Land Use (2024)
- These sources were used to identify historical disaster declarations.
  - Colorado Office of the Governor
  - FEMA
  - United States Department of Agriculture (USDA)
- These inputs informed the hazard profiles:
  - Colorado Climate Preparedness Roadmap (2023)
  - The National Centers for Environmental Information (NCEI) Storm Events Database (2025)
  - NOAA National Weather Service (NWS) Storm Prediction Center
  - NWS Denver-Boulder Weather Forecast Office
  - Jefferson County Designated Dipping Bedrock Areas Guide (2024)

- Jefferson County Comprehensive Emergency Management Plan (CEMP) Evacuation Annex (2024)
- City of Arvada Climate Action and Sustainability Plan (2024)
- City of Westminster Hazard Mitigation Plan (2023)
- Genesee Water and Sanitation District Source Water Protection Plan (January 2025)

2.3 Planning Activities

The following section details activities utilized as part of the HMP update, including meetings and workshops. Significant points of discussion and decisions made are provided. Detailed agendas and participation tracking documentation are included in the **HMP APPENDICES**.

2.3.1 Pre-Kickoff Meeting

On July 31, 2025, the county's designated project manager, Jefferson County Sheriff's Office Emergency Management Supervisor, Emergency Management Coordinators, Grant Specialists, and the consultant team held an initial meeting before the kickoff workshop. The following topics were discussed.

- Hazard mitigation overview
- Project scope and schedule
- Roles and responsibilities
- Public engagement strategy
- 2022 HMP input/recent Planning
- Hazards to profile
- Recent hazard events
- Lifelines
- Next steps

A follow-up pre-kickoff meeting with the county and the consultant team was held on August 19, 2025. The purpose of this meeting was to finalize the project schedule and identify the hazards to profile. The discussion also covered additions to the Planning Team roster and initial ideas for the public engagement strategy. The meeting concluded with scheduling the kickoff workshop, including the day, time, and location.

Before the pre-kickoff follow-up, the consultant team held initial coordination meetings with relevant entities across the county. A meeting was held with the

county's GIS specialists to review data and analysis needs. The Sheriff's Office Public Affairs and County Public Affairs teams were also met with to discuss the public engagement strategy and county branding. A separate meeting with County Planning & Zoning was also held to review current development trends and the county's draft comprehensive plan update.

2.3.2 Planning Team Kickoff Workshop

A hybrid kickoff meeting was held on September 24, 2025, at Red Rocks Community College in Lakewood and virtually through Microsoft Teams. The meeting introduced the benefits of the hazard mitigation plan, clarified planning roles, and outlined a schedule to achieve timely FEMA approval. The Planning Team agreed to prioritize public engagement through the utilization of surveys, digital tools, and to translate the survey and public materials. The hazards to be profiled were confirmed, and the HMP's mitigation goals were also reviewed.

2.3.3 Planning Team Risk Assessment Workshop

A hybrid risk assessment workshop was held on November 17, 2025. The workshop focused on presenting and discussing the results of the completed risk and vulnerability assessment. Participants were updated on public engagement efforts to date, including the distribution of the public survey. They discussed additional event details, data sources, gaps in local lifeline mapping, and the need to coordinate with state agencies, particularly regarding mitigation actions for hazards outside the county's control. Key decisions included the county-wide hazard risk ranking.

The session concluded with plans for the individual coordination meetings, during which each local government's specific hazard vulnerabilities would be captured. Following the workshop, the Planning Team received a draft of the risk assessment chapter and was asked to provide any edits or comments.

2.3.4 Planning Team Mitigation Strategy Workshop

A hybrid mitigation strategy workshop was held on April 28, 2026, at Red Rocks Community College in Lakewood and virtually through Microsoft Teams. The workshop focused on presenting and discussing:

- A recap of public engagement efforts and input received
- Plan maintenance and continued public engagement
- Draft Plan and Annexes

2.3.5 Planning Team Individual Coordination Meetings

In addition to participating in planning events, formal participants were also required to attend individual coordination meetings (ICM) with the consultant team. These coordination meetings are where local inputs vital to a successful, ultimately FEMA-approvable HMP were captured. The discussion focused on several topics, including:

- Past mitigation action reporting
- Mitigation capability assessment
- Local vulnerabilities & mitigation solutions
- HHPD
- Hazard risk ranking
- Vulnerability changes relating to development
- Past HMP incorporation / future HMP integration
- Continued public involvement
- Changing priorities

2.4 Public and Stakeholder Participation

Public and stakeholder participation was a vital part of the HMP update, ensuring the plan was created with all residents of and visitors to Jefferson County in mind. The public engagement strategy was discussed early in the planning process with the Planning Team to generate ideas for effectively sharing information with the public and gathering their input to include in the plan.

2.4.1 Stakeholders Representing Access and Functional Needs Populations

Leading up to and during the kick-off workshop, the Planning Team discussed various community-based organizations in Jefferson County that serve vulnerable populations. Often, these populations face the most significant challenges in recovering from a disaster and find it difficult to engage meaningfully in such planning processes, as they are just trying to live day to day. Following the kick-off workshop, it was decided that outreach should be through the Access and Functional Needs (AFN) Advisory Group, a Jefferson County group led by the Jefferson County Sheriff's Office of Emergency Management and Jefferson County Public Health.

An overview presentation about the hazard mitigation planning process was given to the AFN Advisory Group on February 24, 2026. The following organizations were present:

- Foothills Fire Protection District
- Front Range Animal Evacuation Team
- CO DHSEM AFN
- Atlantis Community, Inc.
- Jeffcom 911
- Jefferson County Veteran Services Office
- Jefferson County Schools
- Jefferson County Sheriff's Office of Emergency Management
- Jefferson County Public Health
- Jefferson County Human Services, Mass Care
- University of Colorado Denver School of Medicine
- American Red Cross

Following the presentation, a Stakeholder Vulnerability survey was shared with the entire AFN Advisory Group. The goal of the survey was to better understand the vulnerabilities and concerns of the communities that they serve. Eleven total responses were received from organizations that serve older adults, people with disabilities, low-income households, people experiencing homelessness, people facing food and housing insecurity, veterans and their families, populations with limited English proficiency, and visitors and seasonal tourists.

Responses indicated that the most concerning hazards are wildfire, severe wind, severe winter weather, extreme heat, and drought. Stakeholders ranked evacuating or sheltering themselves and their families as the top concern during a disaster, followed closely by not receiving emergency alerts. Access to medications and medical professionals was the next most important issue, with lack of clean water and lack of transportation also emerging as significant concerns.

The AFN Advisory Group was also provided the opportunity to review the Public Review Draft.

2.4.2 Community Survey

The community survey was developed in English and Spanish. The survey was open to the public from November 5, 2025 through April 20, 2026. The Jefferson County

Sheriff's Office Public Affairs, Jefferson County Public Affairs, and the Planning Team were crucial in disseminating community messages through social media. The AFN Advisory Group was also provided with engagement materials to advertise the public survey and assisted in disseminating them. In total, 125 responses were received. Public responses were reviewed during Planning Team workshops, informing the mitigation strategy, planning process, and risk assessment chapters of this HMP.

The public's perceived risk to the hazards profiled in this plan aligns with the Planning Team's rankings for each hazard. The public's top concerns relate to wildfire, severe wind, and hail. These are closely followed by the hazards of drought and severe winter weather. While the county ranks flooding as a "high" hazard, it is mostly a localized issue, which is why many survey participants may not have ranked this as a top hazard from their perspective.

Public survey responses regarding desired mitigation actions reveal a clear and consistent set of community priorities for Jefferson County. The dominant theme by a wide margin is wildfire mitigation, with residents frequently calling for increased vegetation management, including thinning, removal of dead or diseased trees, beetle-kill cleanup, and expanded defensible space. Many responses also referenced innovative or large-scale approaches such as grazing, biomass removal, and broader forest management strategies. This strong emphasis reflects widespread concern about wildfire risk across many communities and reinforces the importance of continuing and expanding fuel reduction programs on both public and private lands.

The second most prominent concern is evacuation capacity and access, particularly in mountainous and unincorporated areas. Respondents repeatedly highlighted limitations in existing road networks, including single-access neighborhoods, constrained roadway capacity, and uncertainty about evacuation procedures during emergencies. These comments show a need for continued evacuation planning, including development of secondary egress routes where feasible, enhanced route maintenance and clearance, and clearer communication about evacuation protocols.

In addition to these primary concerns, residents identified several supporting mitigation needs. These include utility and power resilience (such as undergrounding lines and improving grid reliability – or reducing the impacts of

Public Safety Power Shutoffs [PSPS]), public education and preparedness (including alerts, training, and go-bag guidance), and home-level mitigation actions like structural hardening and defensible space improvements. Respondents also noted the importance of targeted flood and drainage improvements. Some responses raised policy-related considerations such as land use, development patterns, and building codes in hazard-prone areas.

Overall, the survey results demonstrate strong public support for a comprehensive mitigation approach that combines landscape-scale wildfire risk reduction, improved evacuation safety, infrastructure resilience, and household-level preparedness (88% of respondents have mitigated their homes to some extent). These findings provide clear justification for prioritizing wildfire mitigation and evacuation planning in the Hazard Mitigation Plan update, while also supporting complementary investments in infrastructure, education, and localized hazard reduction projects.

The Planning Team reviewed the results of the community survey at the Mitigation Strategy workshop. Based on the input received, the county decided to increase the priority of the following mitigation actions from 'medium' to 'high': JC24, JC40, JC41, JC50, JC54.

2.4.3 Public Review Draft and Comment

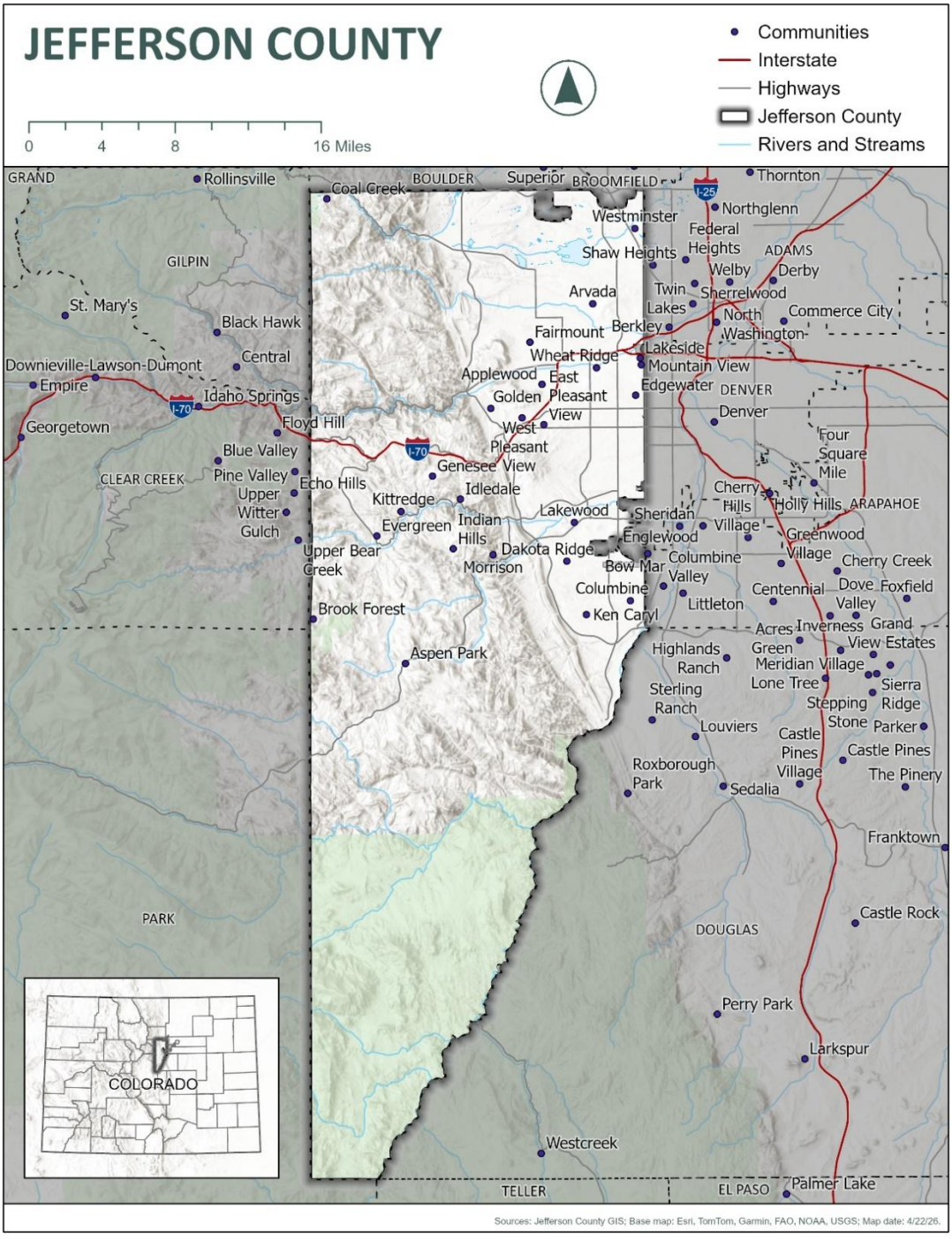
Following a review by all participating local governments, a two-week public review and comment period was held from May 21st through June 5th, 2026. The public review was widely communicated through the identified messaging tools. Individuals had the opportunity to submit comments via an online survey. A total of xyz….comments were incorporated…

Additionally, the draft plan was distributed to all high and significant hazard potential dam owners, via the Colorado Division of Natural Resources' Dam Safety Branch. No comments were received.

3 County Profile

An overview of the Jefferson County planning area and participants is presented in **FIGURE 5**.

Figure 5 Jefferson County Overview



It is important to understand the county's demographic profile. Often, under-resourced and vulnerable communities face the most significant challenges during disaster response and recovery and struggle to invest in mitigation. From the perspectives of hazard mitigation planning and emergency management, it is crucial to consider populations that may be particularly vulnerable to or disproportionately affected by disasters.

TABLE 2 compares selected community demographics in Jefferson County to those of the State of Colorado, using data from the U.S. Census Bureau's American Community Survey five-year estimates (2020-2024). Jefferson County has a higher percentage of residents aged 65 and older than the state.

Table 2 Jefferson County Demographic Estimates Summary

Demographic	Jefferson County	Colorado
Total Population	579,377	5,862,189
Under 5 years old (%)	4.7%	5.3%
Under 18 years old (%)	18.5%	21%
65 years old and Older (%)	17.9%	15.6%
Persons in Poverty (%)	6.7%	9.4%
Persons with a Disability (%)	11%	11.4%
Speak a language other than English	10%	16.2%
Speak English less than "very well" (%)	2.8%	5.6%
Households with Broadband Internet Subscription (%)	95.1%	93.5%
Total Housing Units	253,574	2,589,053
Total Occupied Housing Units (%)	95.3%	91.7%
Owner Occupied Homes (%)	70.7%	66.2%
Renter Occupied Homes (%)	29.3%	33.8%
Mobile Homes (% of total housing stock)	0.8%	3.5%
No vehicles available (%)	4%	5.2%
Only 1 vehicle is available (%)	29.2%	30.7%

Source: U.S. Census Bureau's American Community Survey five-year estimates (2020-2024)

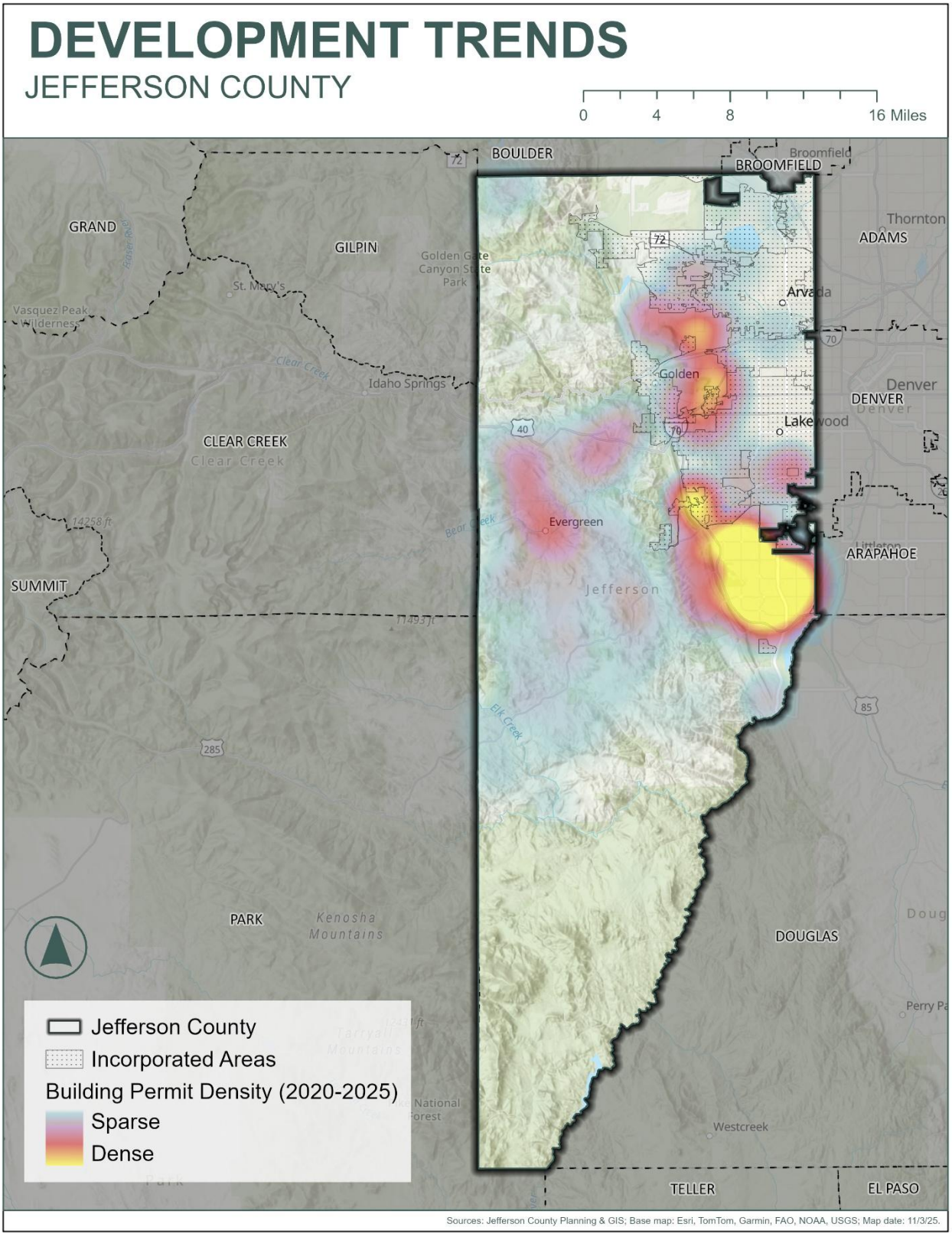
3.1 Development Trends

Development provides an opportunity for communities to mitigate future hazard risk. Building outside of known hazard areas, combined with mitigation efforts to reduce or eliminate known risks, will help make Jefferson County communities more resilient to the impacts of future disaster events.

Recent development within the county has expanded growth into hazard-prone areas, including the Wildland-Urban Interface (WUI), floodplains, steep slopes, and other environmentally sensitive areas. The WUI now encompasses approximately 91% of the county, and continued development trends indicate additional growth in areas exposed to wildfire, flooding, severe weather, geologic hazards, and other natural hazards. As development increases, so does the number of people, structures, and critical infrastructure exposed to potential hazard events. While this growth contributes to a higher overall exposure, the county has adopted and continues to enforce land use regulations, building codes, floodplain management standards, and hazard-specific codes to reduce vulnerability and limit future risk. Recent updates, including enhanced wildfire resiliency standards, are intended to strengthen the durability of new and substantially improved structures.

Building permits issued between 2020 and 2025 throughout the county are shown in **FIGURE 6**.

Figure 6 Building Permits Issued Throughout Jefferson County, 2020-2025



4 Hazard Identification and Risk Assessment

4.1 Risk Assessment Overview

4.1.1 Introduction

The Hazard Identification and Risk Assessment (HIRA) aims to identify natural and human-caused hazards impacting Jefferson County and evaluate the potential for loss of life, personal injury, economic harm, and property damage. The HIRA serves as a critical input into the mitigation strategy, providing a collaborative assessment that considers local community risk. The HIRA process focuses on the following elements:

- **Hazard identification** - Determine disaster hazard types, frequency, and severity using available information.
- **Vulnerability identification** - Assess the impact on people, property, environment, economy, and lands with the best available data.
- **Loss evaluation** - Estimate potential damages, losses, or costs that can be avoided through mitigation with the best data.

4.1.2 Identified Hazard of Concern

For the development of this HMP, the Planning Team examined the full range of hazards that could affect the county and identified those that pose the most significant concern. The process included a review of the 2023 Colorado Enhanced State Hazard Mitigation Plan (CO E-SHMP) and the current county HMP, along with information on the frequency, magnitude, and costs associated with hazards that have affected or could affect the planning area. Additionally, anecdotal information regarding hazards and the perceived vulnerability of the assets within the planning area was considered.

Based on this evaluation, this plan profiles the following hazards of concern:

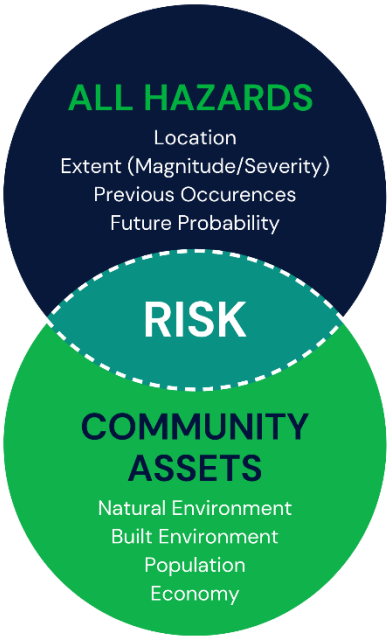
- Dam Incident
- Drought
- Earthquake
- Extreme Heat
- Flood

- Ground Instability Hazards (Erosion/Deposition, Expansive Soils/Heaving Bedrock, Ground Subsidence)
- Hail
- Lightning
- Severe Wind
- Severe Winter Weather
- Slope Failure Hazards (Landslide, Debris Flow, Rockfall, Avalanche)
- Tornado
- Wildfire
- Cyber Attack
- Pandemic

Several hazards were profiled together because of their common occurrence, exposure areas, or damage assessments. These hazards include ground instability and slope failure. Extreme heat was separated from extreme cold and profiled as a stand-alone hazard, while extreme cold is profiled alongside severe winter weather. All other natural hazards profiled in the 2023 CO E-SHMP were reviewed for inclusion in this update. Those hazards that are not profiled in this plan (animal disease outbreak, pest infestation, and wildlife-vehicle collision) do not currently present an immediate or impactful risk to Jefferson County or are covered in other planning mechanisms and are, therefore, not a mitigation priority.

4.1.3 Hazard Risk Ranking

Each local government determined a risk ranking for the hazards profiled in this plan. This risk ranking assessed the probability of each hazard's occurrence and its likely impact on the planning area's people, property, and environment.



Initial rankings for the county were calculated using a four-category scale. For the probability of the hazard, the options included "unlikely (1)," "likely (2)," "highly likely (3)," and "annually (4)." For the impacts of the hazards, the scale included "minor (1)", "limited (2), "critical (3)", and "catastrophic (4)".

The rankings were then quantified by combining the impact scores and multiplying by the probability score, which correlates to the "high", "moderate" (mod), and "low" risk rankings. **TABLE 3** provides the results for Jefferson County. For hazard risk rankings for each local government, refer to the individual local government annexes.

Table 3 Jefferson County Hazard Risk Rankings

Hazard	Prob. x	(Impact on People +	Impact on Property/ Environ.	(Impact on Economy +	= Relevant Risk	Risk Rank
Dam Incident	2	3	3	4	20	Mod
Drought	3	2	3	3	24	Mod
Earthquake	1	3	3	3	9	Low
Extreme Heat	3	3	2	2	21	Mod
Flood	3	3	3	4	30	High
Ground Instability Hazards	2	2	3	3	16	Low
Hail	3	3	3	3	27	High

Hazard	Prob. x	(Impact on People +	Impact on Property/ Environ.	(Impact on Economy +	= Relevant Risk	Risk Rank
Lightning	3	2	2	1	15	Low
Severe Wind	4	2	2	2	24	Mod
Severe Winter Weather	3	3	2	2	21	Mod
Slope Failure Hazards	3	1	2	2	15	Low
Tornado	2	2	1	2	10	Low
Wildfire	3	3	4	3	30	High
Cyber Attack	4	2	2	3	28	High
Pandemic	2	3	1	3	14	Low

Note: Select hazards were identified as affecting the county, but have not been identified as a mitigation priority by some local governments. Reasons for this include:

- The hazard does not present an immediate or impactful risk.
- The hazard has been mitigated through existing capabilities.
- The local government cannot mitigate the hazard as it occurs outside of its jurisdiction.

These hazards are denoted as not applicable (N/A), and additional details are provided in the relevant 'Local Exposure and Vulnerability' sections within each local government annex.

4.1.4 Hazard Profiles

This chapter provides detailed hazard profile sections for each of the 15 hazards assessed in this plan. Each profile follows the same outline and addresses the following topics:

- General Background
- Past Events
- Location
- Severity

- Secondary Hazards
- Exposure and Vulnerability
    - Lifelines
    - People
    - Structures
    - Natural, Historic, and Cultural Resources
    - Local Vulnerability
- Probability of Future Occurrences
    - Annually – Expected to occur every year
    - Highly Likely – Occurring every 1 to 10 years
    - Likely – Every 10 to 50 years
    - Unlikely – Intervals of over 50 years
- Climate Change Impacts

4.2 Disaster Declaration History

Jefferson County has been designated in numerous state and federal disaster declarations. Drought, floods, pandemic, severe winter weather, thunderstorms, and wildfires have significantly impacted the county and its communities, as illustrated in the following tables.

4.2.1 State of Colorado Disaster Declarations

Jefferson County has been designated in 29 state disaster declarations. Most declarations were related to wildfire (10) and winter weather (8). The remaining declarations were related to floods, landslides/rockfalls, drought, extreme weather, and biological hazards. **TABLE 4** shows these state declarations by date and designated areas. Due to the regional nature of most of these hazards, many of the declarations were statewide.

Table 4 State Disaster Declarations, Including Jefferson County

Year	Hazard	Locations Affected
1981	Tornadoes	Adams, Denver, Jefferson, Weld Counties
1982	Severe Winter Storm	Denver, Arapahoe, Adams, Jefferson, Boulder, El Paso, Weld Counties

Year	Hazard	Locations Affected
1994	Wildfires	Garfield, Delta, Douglas, Jefferson Counties; Statewide
1996	Wildfire	Buffalo Creek, Jefferson County
1996	Flood	Buffalo Creek, Jefferson County
1997	Landslides	Jefferson County
2000	Wildfires – multiple Executive Orders	Montezuma, Jefferson, Park, Boulder, Larimer, Las Animas Counties
2002	Wildfires	Statewide
2002	Drought	Statewide
2003	Snow	Statewide
2005	Hurricane Katrina Evacuation	Statewide
2007	Rockfalls	I-70, U.S. Highway 6 Garfield; Clear Creek, Jefferson Counties
2009	Severe Blizzard	Statewide
2011	Wildfire	Jefferson County
2012	Wildfire	Jefferson County
2013	Winter Storm	Statewide
2013	Flooding	Adams, Arapahoe, Broomfield, Boulder, Chaffee, Clear Creek, Crowley, Denver, El Paso, Gilpin, Fremont, Jefferson, Lake, Larimer, Lincoln, Logan, Morgan, Otero, Park, Pueblo,

Year	Hazard	Locations Affected
		Prowers, Sedgwick, Washington, Weld Counties
2013	Wildfire	Jefferson County
2014	Extreme Weather	Statewide
2017	Wildfire	Statewide
2017	Snow and Heavy Rains	Jefferson, Boulder, Larimer, Weld Counties
2018	Wildfire	Statewide
2019	Severe Winter Weather and Blizzard Conditions	Logan, Douglas, Arapahoe, Adams, Jefferson, Elbert, Phillips, Sedgwick, Morgan, Larimer, El Paso Counties
2019	Severe Winter Weather and Blizzard Conditions	Larimer, Weld, Logan, Sedgwick, Phillips, Boulder, Morgan, Washington, Yuma, Clear Creek, Adams, Broomfield, Jefferson, Denver, Arapahoe, Douglas, Elbert, Lincoln, Kit Carson Counties
2020	COVID-19	Statewide
2020	Wildfire	Statewide
2021	Severe Winter Weather	Statewide
2022	Avian Influenza	Statewide
2023	Extreme Cold	Statewide

Source: State of Colorado Governor's Office

4.2.2 Federal Disaster Declarations

Federal disaster declarations are issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal

government. A federal disaster declaration puts recovery programs into motion to help disaster victims, businesses, and public entities. Federal disaster declarations have occurred 15 times since 1955 (**TABLE 5**), with four being Major Disaster declarations for flood and four Fire Management declarations.

Table 5 Federal Disaster Declarations

Year	Declaration Number	Declaration Type	Hazard	Declaration Title
1969	DR-261-CO	Major Disaster Declaration	Flood	Severe Storms & Flooding
1973	DR-385-CO	Major Disaster Declaration	Flood	Heavy Rains, Snowmelt And Flooding
2000	FM-2309-CO	Fire Management	Fire	High Meadows Fire
2002	DR-1421-CO	Major Disaster Declaration	Fire	Wildfires
2003	EM-3185-CO	Emergency	Snowstorm	Snow
2005	EM-3224-CO	Emergency	Coastal Storm	Hurricane Katrina Evacuation
2007	EM-3270-CO	Emergency	Snowstorm	Snow
2011	FM-2873-CO	Fire Management	Fire	Indian Gulch Fire
2012	FM-2975-CO	Fire Management	Fire	Lower North Fork Fire
2013	EM-3365-CO	Emergency	Flood	Severe Storms, Flooding, Landslides, And Mudslides
2013	DR-4145-CO	Major Disaster Declaration	Flood	Severe Storms, Flooding, Landslides, And Mudslides
2020	EM-3436-CO	Emergency	Biological	Covid-19

Year	Declaration Number	Declaration Type	Hazard	Declaration Title
2020	DR-4498-CO	Major Disaster Declaration	Biological	Covid-19 Pandemic
2023	DR-4731-CO	Major Disaster Declaration	Flood	Severe Storms, Flooding, And Tornadoes
2024	FM-5526-CO	Fire Management	Fire	Quarry Fire

Source: OpenFEMA

4.2.3 United States Department of Agriculture (USDA) Disaster Designations

The U.S. Secretary of Agriculture has the authority to designate counties as disaster areas to provide emergency (EM) loans to producers suffering losses in those counties and neighboring counties. Besides EM loan eligibility, other emergency assistance programs, like the Farm Service Agency (FSA) disaster assistance programs, have traditionally used disaster designations as a requirement for eligibility. A USDA disaster declaration designates counties that have faced at least a 30% loss in one or more crops or livestock due to a natural hazard event. A Fast Track disaster designation is initiated when any part of a county meets severe drought intensity levels for eight consecutive weeks or high drought intensity levels for any duration.

Between 2012 and 2024, Jefferson County was included in 13 USDA Disaster Declarations (**TABLE 6**). Most of the declarations were related to drought events, except for one event related to hail and high winds.

Table 6 USDA Disaster Declarations, Including Jefferson County

Crop Year	Disaster Number	Hazard 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	Severe Hail and High Winds

Crop Year	Disaster Number	Hazard Type
2018	S4386	Drought- FAST TRACK
2018	S4408	Drought – FAST TRACK
2019	S4468	Drought – FAST TRACK
2019	S4481	Drought – FAST TRACK
2020	S4798	Drought – FAST TRACK
2020	S4848	Drought – FAST TRACK
2021	S4917	Drought – FAST TRACK
2022	S5147	Drought – FAST TRACK
2023	S5372	Drought – FAST TRACK

Source: USDA

4.3 Exposure Analysis

4.3.1 Community Lifelines

4.3.1.1 Critical Facilities

According to FEMA, community lifelines are critical services and infrastructure essential for community well-being. This framework helps emergency managers focus on the most vital needs during disasters. As part of hazard mitigation planning, a lifeline analysis identified 1,627 critical facilities in county risk areas, highlighting system vulnerabilities for targeted response strategies. Data came from sources such as Jefferson County Business Innovation and Technology (BIT) and the 2024 Jefferson County Community Wildfire Protection Plan (CWPP) Highly Valued Resources & Assets (HVRAs) dataset. Lifeline data was organized using FEMA's framework, summarized below. For local breakdowns, see the local government annexes.

- **Communications: 290 Facilities**
  - Communication Towers
  - USPS Facilities
  - Weather Stations
- **Energy: 57 Facilities**
  - Power Plants
  - Public Utility Buildings
  - Wind Energy

  - Wind Turbines
- **Food, Hydration, Shelter: 32 Facilities**
  - Food Banks
  - Libraries
- **Hazardous Materials: 11 Facilities**
  - Nuclear Facilities
  - Solid Waste Landfills
- **Health and Medical: 94 Facilities**
  - EMS Stations
  - Hospitals
  - Urgent Care Facilities
- **Safety and Security: 942 Facilities**
  - Amphitheaters
  - Event Centers
  - Fire Stations
  - Government Buildings
  - Jails
  - National Guard Armories
  - Police Departments
  - Recreational Facilities
  - Schools
  - Welfare Services
- **Transportation: 79 Facilities**
  - Airports
  - Trailheads
- **Water Systems: 122 Facilities**
  - Dams
  - Water Treatment Facilities

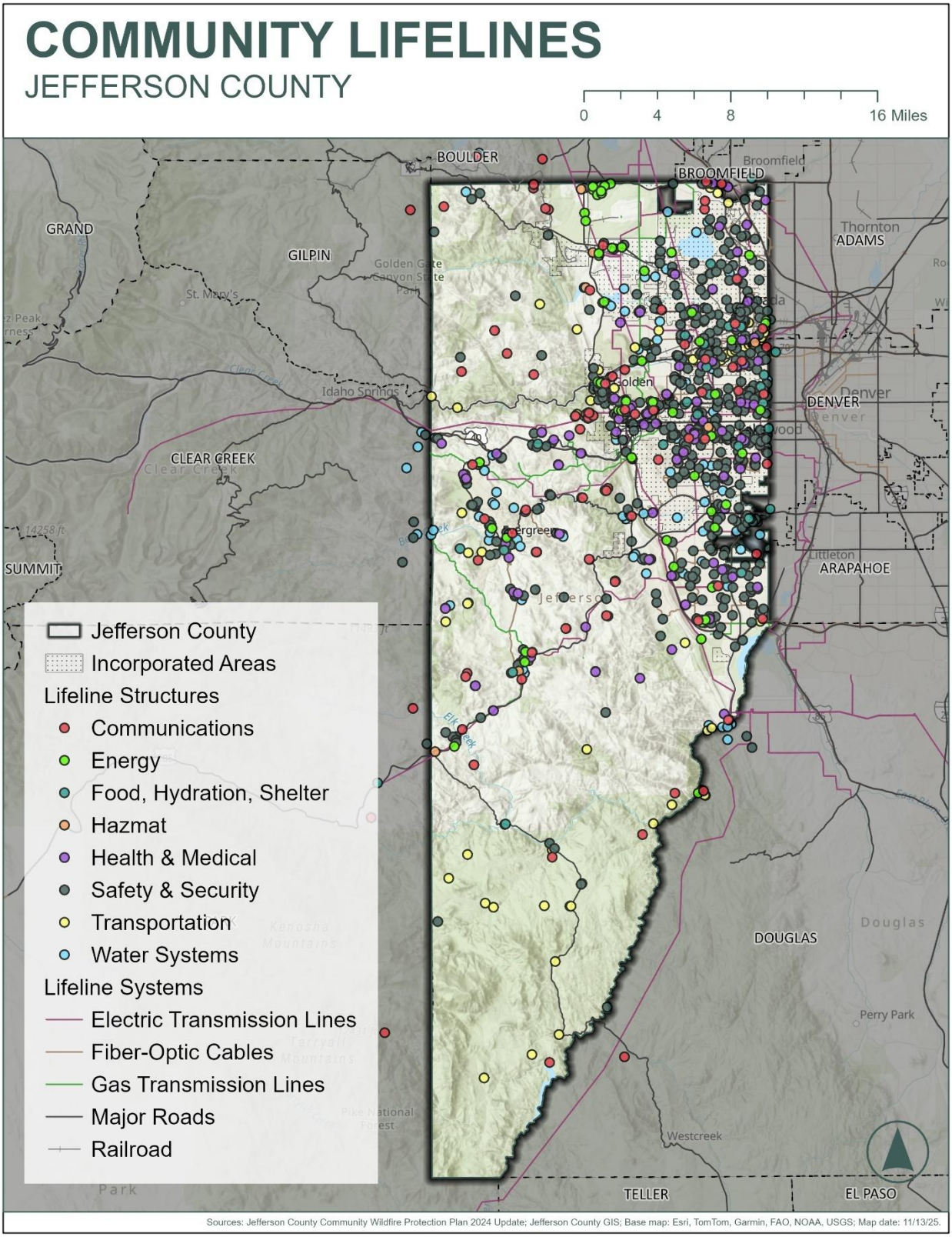
4.3.1.2 Lifeline Systems

In addition to the point-based lifeline data analysis of critical facilities, a broader assessment of linear lifeline systems was conducted. Disruptions caused by natural hazards at any point along these systems have the potential to trigger cascading impacts throughout the county. The data was again organized by community lifeline categories, as summarized below.

- **Communication:**
  - Fiber-optic Cables: 783.2 miles
- **Energy:**
  - Electric Transmission Lines: 251.4 miles
  - Gas Transmission Lines: 81.9 miles
- **Transportation:**
  - Major Roadways: 252.0 miles
  - Railway: 52.3 miles

These Lifeline points and systems are mapped in **FIGURE 7** below.

Figure 7 FEMA Community Lifelines in Jefferson County



4.3.2 Structure Inventory

An assessment was conducted to evaluate parcels located within identified hazard-risk areas. This analysis used a combination of parcel data and building footprint data obtained from the Jefferson County Assessor's Office and Business Innovation and Technology (BIT). The building footprint data included information on building type and structure location, while the parcel data provided valuation information.

For analytic purposes, structure values were estimated by calculating each building's square footage and determining its proportional share of the total parcel value for parcels containing multiple structures. It is important to note that this represents the best available data; actual structure values may differ from the estimates produced in this analysis.

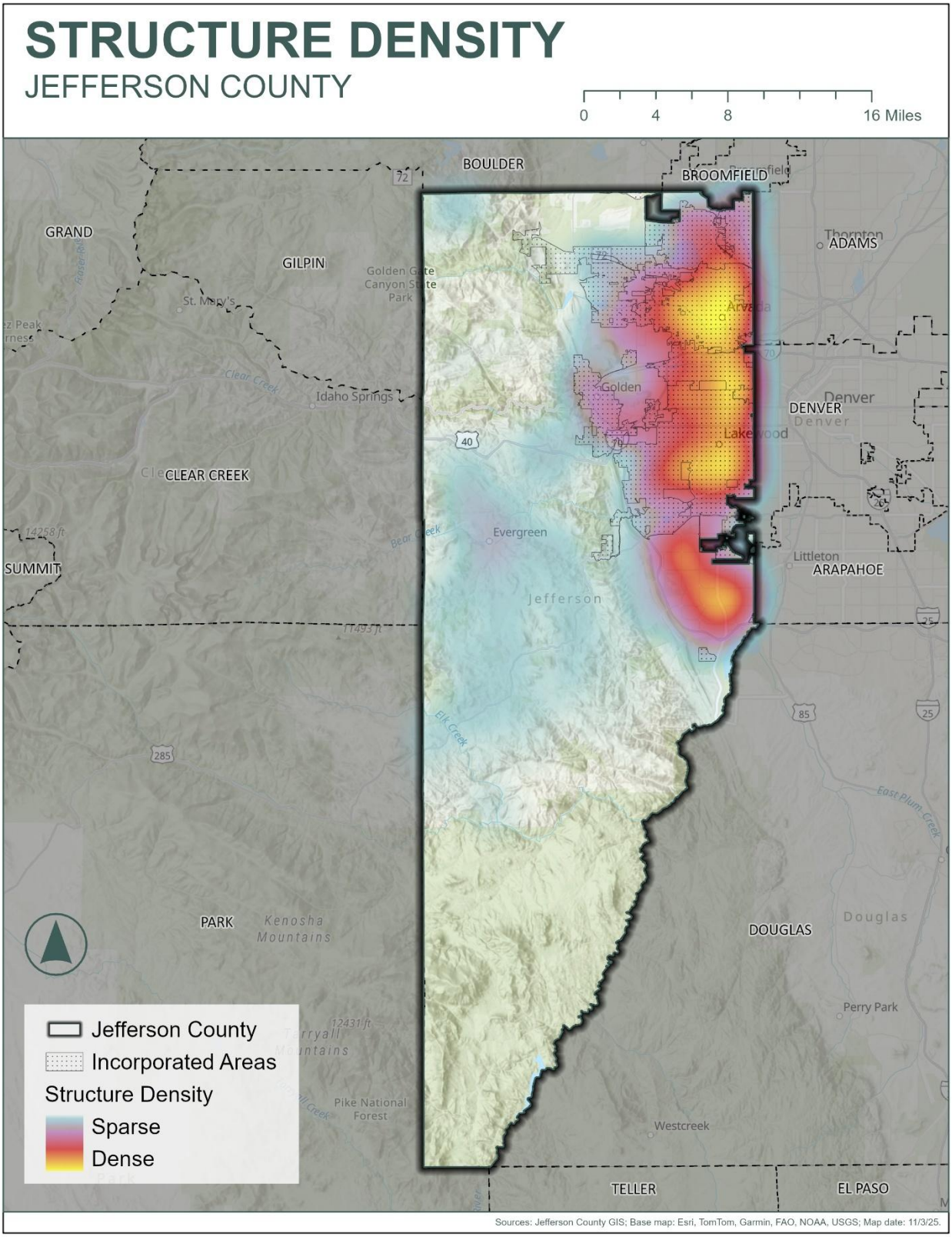
A summary of the total structure inventory is provided in **TABLE 7** and illustrated in **FIGURE 8**. Detailed parcel exposure information for each community can be found in the local government annexes.

Table 7 Total Structures in Jefferson County

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	8,008	$13,514,094,565	$9,116,975,308
Foundation/Ruin	467	$1,390,271,701	$994,870,406
Garage/Shed	136,345	$12,452,859,555	$7,255,327,993
Industrial	1,129	$1,625,835,462	$1,250,610,746
Medical	91	$349,265,575	$343,001,525
Misc.	6,069	$572,890,123	$300,980,469
Parking Structure	45	$557,769,654	$511,142,034
Public	1,819	$2,487,817,903	$1,953,036,882
Residential	173,711	$113,570,813,077	$76,100,864,048
Tank	845	$97,665,603	$31,018,860
Total	**328,529**	**$146,619,283,219**	**$97,857,828,271**

Source: Jefferson County Assessor's Office and Business Innovation and Technology

Figure 8 Density of Structures (Building Footprints) in Jefferson County



4.4 Hazard Data Viewers

The information in the following risk and vulnerability assessments is a snapshot based on the best available data during this plan's development. It is expected that over the 5-year life of this updated HMP, many of these data sets will continue to be improved and enhanced while new data sources will also become available. For communities to ensure they are referencing the latest and greatest hazard data, it is important that they are aware of how to access this information.

Fortunately, communities can now leverage state and federal web map viewers to assess the most current hazard mapping available for many of the hazards profiled in this plan. Details on these currently available tools are shared below and you can access the platforms by clicking the title of the tool.

- **COLORADO FOREST ATLAS – WILDFIRE RISK VIEWER** – is a web-mapping application that allows users to identify specific wildfire risk levels within a ½-mile radius of a home or any other point of interest on the map. A risk level description and link to additional resources are provided for users wanting to reduce their risk.
- **COLORADO DROUGHT PLAN - VISUALIZATION STORY MAP** – is an interactive viewer for sector vulnerability to drought in each county. This map shows the vulnerability assessment findings in the 2018 State of Colorado Drought Mitigation and Response Plan.
- **DAM SAFETY - DAMS (STATE.CO.US)** - Colorado's Decision Support Systems (CDSS) is a water management system developed by the Colorado Water Conservation Board (CWCB) and the Colorado Division of Water Resources (DWR) for each of Colorado's major water basins.
- **CO HAZARD MAPPING & RISKMAP PORTAL** - The vision of Colorado's Risk MAP Program is to deliver quality data that increases public awareness and leads to action that reduces risk to life and property. Risk MAP builds on flood hazard data and maps produced during the Flood Map Modernization (Map Mod) program. Building on the success of Map Mod, FEMA will collaborate with federal, state, and local stakeholders to achieve the five goals of the Risk MAP program:
    - Address gaps in flood hazard data
    - Public awareness/outreach
    - Hazard mitigation planning

  - Enhanced digital platform
  - Alignment and synergies
- **Climate Mapping for Resilience and Adaptation (CMRA) Assessment** – is a tool that provides current and future climate hazard information to assist with prioritizing, identifying, and implementing climate-informed infrastructure investments. As a single source of historical and future climate data, the tool covers exposure to multiple hazards, the status of disadvantaged communities, and building codes. The information can support the planning and implementation of climate-resilient projects.
- **Climate Risk and Resilience Portal (ClimRR)** - provides future climate data to help us plan for and adapt to our changing world. Using one of the world's largest supercomputers, ClimRR models over 60 climate variables to provide the most sophisticated, accessible, dynamically downscaled projections for the United States.
- **Resilience Analysis and Planning Tool (RAPT)** – is a FEMA tool designed to support resilience planning. The tool integrates national datasets on social vulnerability, community resilience, critical facilities and infrastructure, and risk from natural hazards. In late 2025, FEMA integrated the National Risk Index (NRI) dataset into RAPT, enabling users to analyze NRI risk metrics along with other demographic, infrastructure, hazard, and resilience layers within a single GIS platform. The NRI risk framework includes three core components: a natural hazards component (Expected Annual Loss), a consequence-enhancing component (Social Vulnerability), and a consequence-reducing component (Community Resilience).

4.5 Dam Incident

4.5.1 General Background

A dam is a structure built across a river or waterway to regulate water flow. They are designed to prevent or control water movement, thereby reducing flood risks and managing water for power, recreation, agriculture, and other uses. Dam incidents occur when a dam fails or functions dangerously, causing sudden downstream floods. The main types of dam incidents are failures and overflows. Dam failures happen when the dam's structure is compromised, leading to large water releases downstream. Causes include poor maintenance, design flaws,

seismic activity, or extreme weather. Overflows happen when the water level in the reservoir exceeds the dam's capacity or spillway. Excess water is then released to prevent dam failure, but if not managed properly or if it surpasses design limits, it can cause uncontrolled downstream flooding.

For more general background information on dam incidents in Colorado, refer to the **2023 COLORADO E-SHMP**.

4.5.2 Past Events

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 listed in **TABLE 8**. There have been no incidents since the 2022 HMP. Specifics related to these dam failures are not available, but the anticipated impacts of dam failures for high-hazard dams can be found in their emergency action plans (EAPs).

Table 8 Dam Failures and Incidents In and Near Jefferson County

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
Feb. 1979	Maple Grove	Lena Gulch	Lakewood, Wheat Ridge	High	Vandalism	Yes
Jan. 1993	Standley Lake	Big Dry Creek	Westminster	High	Reservoir-Wind Waves	No
April 1998	Fairmount	Clear Creek	Wheat Ridge	High	Reservoir Incident	No

[1] This dam is located in Clear Creek County, but the dam failure affected the City of Golden in Jefferson County

Date	Dam Name	Waterway	Nearest Town	Dam Hazard Potential	Event	Failure ?
June 5, 2013	Montgomery [2]	Middle Fork S. Platte	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	County	High	Hydrologic/ flooding – High Reservoir Level	No
June 17, 2015	Cheesman	S. Platte River	County	High	Hydrologic/ flooding – High Reservoir Level	No
June 22, 2017	Jefferson Lake[2]	Jefferson Creek	County	High	Seepage/ Internal Erosion – Excessive/ increased Seepage	No

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

Source: National Performance of Dams database, Stanford University and Association of State Dam Safety Officials Dam Incident Database

In September 2013, Jefferson County and the entire Front Range experienced heavy rainfall over eight days from the 11th to the 18th. This rainfall caused many dam spillways in Jefferson County and nearby areas to flow. While the spillway overflows prevented structural damage to the dams, they raised concerns among downstream communities unaccustomed to seeing full spillways. There was also worry that spillway flows and outlet discharges might cause downstream flooding. A CBS Denver report noted that residents near Leyden Dam in Arvada were voluntarily evacuated on September 12th. Although a dam failure was not feared, warnings focused on excess runoff from spillways potentially flooding roads dangerously. The event damaged Indiana Street, which remained closed for weeks for repairs. The Mile High Flood District's "A September to Remember" report highlighted that flooding exposed an 18-inch water main within a 36-inch concrete pipe, overtopped the Croke Canal's upstream embankment, and caused shallow flooding of homes and businesses along Leyden Creek. The report also indicated that dam upgrades in 2001 likely prevented a catastrophe involving severe property damage and loss of life.

The Colorado Division of Natural Resources (DNR) has a statewide database that identifies the potential for non-failure dam inundation to show potential flooding areas where outlet capacity exceeds the downstream channel capacity. The dams at the highest risk of non-failure inundation are shown in **TABLE 9**. 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 requiring an emergency response to reduce potential downstream consequences. The ranking is based on a statewide database of high hazard dams, including 441 that the Colorado DNR has analyzed for this aspect of dam incident flooding. The DNR assigned the high, moderate, or low designations by dividing the total number of ranked dams across the state into thirds.

Table 9 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 (Arvada Reservoir)	48" RCP	420	6	High
080324	Chatfield	2-10' X 15.5'	8,300	4	High
090111	Evergreen	12" steel pipe - owner reluctant to use due to loss of pressure in wtp	425	30	High
090240	Genesee No. 2	DIP with multi-level intake	22	119	High
070209	Leyden (Farmers Highline NO 3)	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",2-8	4,000	59	High
020633	Woman Creek	30" STEEL & RCP	75	62	High
090104	Bergen East (Bergen #2)	24 CONC. ENC. HDPE	45	157	Moderate
020635	Fortune	30 inch steel pipe encased in concrete	107	189	Moderate
020226	Ketner (Little Church)	12" CMP w/ insituform liner. New gate and trash rack installed 2024 by Inland Marine.	6	210	Moderate

Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
		Trash rack 1.5-in grid spacing			
090208	Morrison Raw Water (Operations Reservoir)	8" D.I.P.	4	207	Moderate
090131	Polly A. Deane (Hine Reservoir, Bergen Reservoir #3)	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 controlled by bulkhead with 18 x 36 slide gate.	162	161	Moderate
075309	East (Agricultural #3, Little Osner)	18" RCP	22	280	Low
070312	Fairmount Reservoir	No passive outlet. Pump through right abutment.	30	309	Low
090115	Harriman	37" Steel	63	323	Low
070136	Hyatt	8"&10" PVC, sliplined old pipes	18	296	Low
070104	Lookout Mountain (Beaver Brook #3)	2-8" DIP	5	343	Low
070115	Lower Long Lake (Long Lake No 2,	12" CIP	18	341	Low

Dam ID	Dam Name	Outlet Description	Max Outlet Release Capacity (cfs)	Ranking	Outlet Release Hazard Rating
	Campbell #2, Cambell Res)				
075310	Main (Big Osner)	20" CIP	32	284	Low
070320	Tucker Lake - North Dam	12" RCP	0	348	Low
070114	Upper Long Lake (Long Lake No 1, Campbell #1, Cambell Res)	18" CIP	61	367	Low
090204	Willow Springs #1	6" steel	2	358	Low

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

4.5.3 Location

The National Inventory of Dams lists 88 dams in Jefferson County, categorized by their potential hazard levels. Among them, 31 are identified as High-Hazard dams, indicating that their failure could result in significant loss of life and property damage. Additionally, 11 dams are classified as Significant Hazard, posing risks primarily to property and infrastructure. The remaining 46 are low-hazard dams, with minimal expected consequences if they fail. Details on the high and significant hazard dams and their specific locations within the county are provided in **TABLE 10** below and **FIGURE 9** shows dam locations and inundation areas across the county. **TABLE 11** lists high and significant hazard dams that are outside of Jefferson County but could impact the county if these dams were to fail.

Table 10 High and Significant Dams in Jefferson County

Hazard Potential	Federal ID	Dam Name (Other Name)	Owner Type	Downstream Community	Condition
High	CO00004	Bear Creek Dam (Bear Creek Lake)	Federal	Denver	Not Available

Hazard Potential	Federal ID	Dam Name (Other Name)	Owner Type	Downstream Community	Condition
High	CO00004S001	Bear Creek Dam - South Embankment (Bear Creek Lake)	Federal	Denver	Not Available
High	CO01821	Bergen East (Bergen #2)	Private	Morrison	Satisfactory
High	CO00980	Blunn (Arvada Reservoir)	Local Government	Arvada	Satisfactory
High	CO00357	Cheesman	Public Utility	Deckers	Satisfactory
High	CO00267	East (Agricultural #3, Little Osner)	Private	Lakewood	Satisfactory
High	CO00328	Evergreen	Public Utility	Evergreen	Fair
High	CO02751	Fairmount Reservoir	Public Utility	Wheat Ridge	Satisfactory
High	CO02814	Fortune	Public Utility	Westminster	Satisfactory
High	CO02924	Genesee No. 2	Public Utility		Satisfactory
High	CO01823	Harriman	Public Utility	Lakewood	Satisfactory
High	CO01250	Hyatt	Private	Arvada	Unsatisfactory
High	CO00093	Ketner (Little Church)	Private	Westminster	Satisfactory
High	CO01216	Leyden (Farmers Highline No. 3)	Not Listed	Arvada	Satisfactory
High	CO02088	Lookout Mountain (Beaver Brook #3)	Local Government	Golden	Satisfactory

Hazard Potential	Federal ID	Dam Name (Other Name)	Owner Type	Downstream Community	Condition
High	CO01784	Lower Long Lake (Long Lake No 2, Campbell #2, Cambell Res)	Public Utility	Arvada	Unsatisfactory
High	CO00201	Magic Mountain #1	Private	Pleasant View	Not Rated
High	CO00301	Main (Big Osner)	Private	Lakewood	Satisfactory
High	CO00203	Maple Grove	Public Utility	Lakewood	Satisfactory
High	CO02676	Morrison Raw Water (Operations Reservoir)	Local Government	Morrison	Satisfactory
High	CO00336	Polly A. Deane (Hine Reservoir, Bergen Reservoir #3)	Private	Littleton	Unsatisfactory
High	CO00205	Ralston	Public Utility	Arvada	Satisfactory
High	CO00307	Smith	Private	Lakewood	Unsatisfactory
High	CO00101	Standley Lake	Private	Westminster	Satisfactory
High	CO03011	Tucker Lake - North Dam	Private	Arvada	Satisfactory
High	CO01181	Tucker Lake - South Dam	Private	Arvada	Satisfactory
High	CO01783	Upper Long Lake (Long Lake No 1, Campbell #1, Cambell Res)	Public Utility	Arvada	Unsatisfactory
High	CO00345	Wellington	Private	Buffalo Creek	Fair

Hazard Potential	Federal ID	Dam Name (Other Name)	Owner Type	Downstream Community	Condition
High	CO01791	Willow Springs #1	Private	Lakewood	Fair
High	CO02787	Woman Creek	Local Government	Westminster	Satisfactory
Significant	CO00327	Beers Sisters Lake	Local Government	Littleton	Satisfactory
Significant	CO01790	Bergen West (Bergen #1)	Private	Lakewood	Fair
Significant	CO01822	Bowles #1	Private	Bowmar	Satisfactory
Significant	CO02413	Carmody (Kendrick Lake #1, Cottonwood Lake)	Local Government	Lakewood	Satisfactory
Significant	CO02917	Devinney	Local Government	Lakewood	Satisfactory
Significant	CO00329	Harwood's Storage Reservoir (Kingfisher Lake)	Private	Lakewood	Satisfactory
Significant	CO01827	Johnston (Johnson)	Private	Littleton	Satisfactory
Significant	CO00297	Kendrick	Local Government	Lakewood	Satisfactory
Significant	CO02426	Lockport (Buchanan Pond; Village at Sodacreek Pond)	Private	Kittredge	Fair
Significant	CO02854	Meadowview	Private		Satisfactory
Significant	CO00204	Pomona No. 2 and No. 3	Private	Arvada	Satisfactory

Source: USACE National Inventory of Dams (NID)

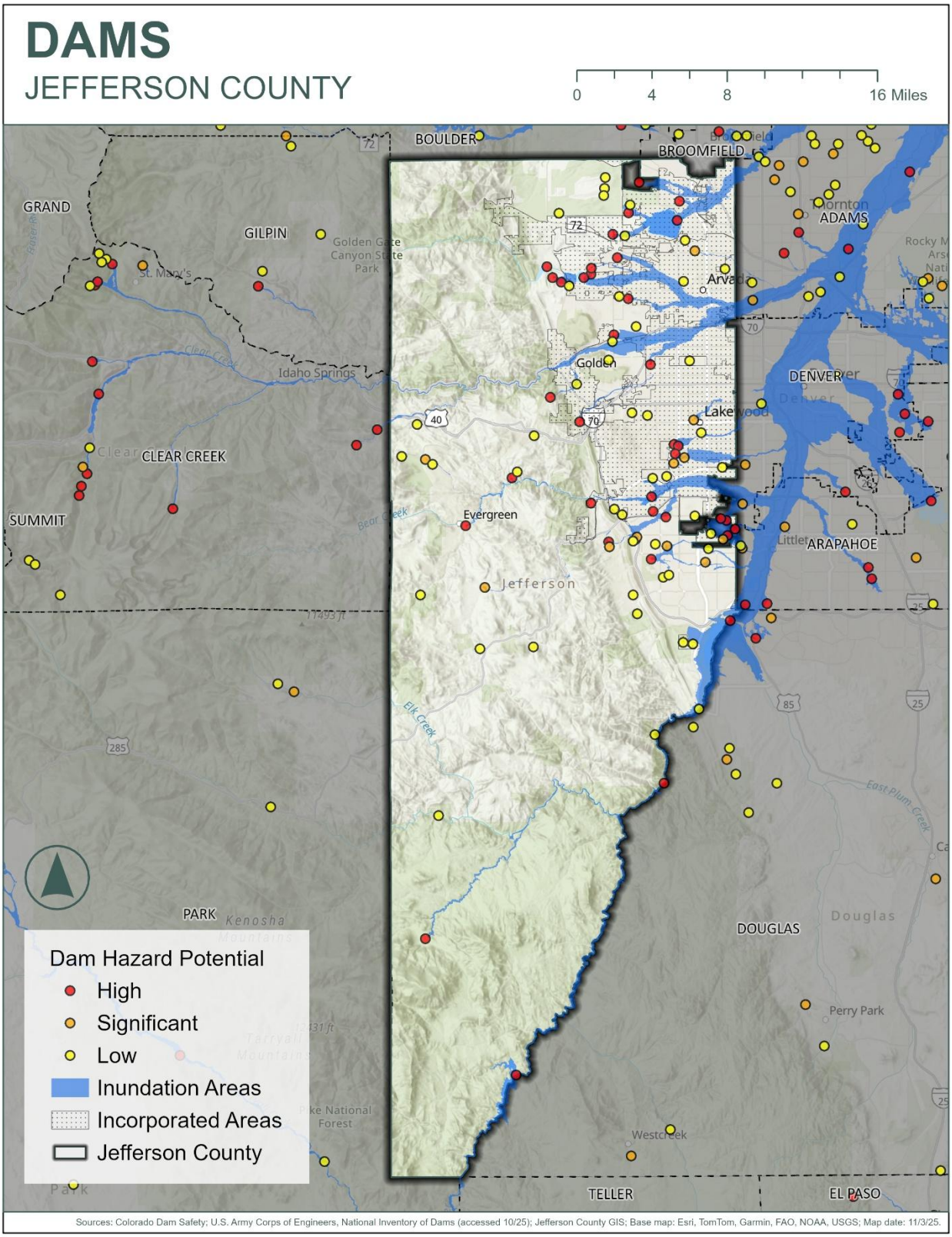
Table 11 Other High and Significant Hazard Dams That May Impact Jefferson County

Hazard Potential	Federal ID	Dam Name	Owner Type	Downstream Community	Condition
High	CO00187	Lower Beaver Brook	Local Government	Golden	Satisfactory
High	CO00188	Upper Beaver Brook	Local Government	Golden	Satisfactory
High	CO01239	Cabin Creek Upper	Public Utility	Georgetown	Satisfactory
High	CO01240	Cabin Creek Lower	Public Utility	Georgetown	Satisfactory
High	CO01782	Idaho Springs	Local Government	Idaho Springs	Satisfactory
High	CO00191	Lower Chinns	Private	Idaho Springs	Not Rated
High	CO01241	Clear Lake	Public Utility	Georgetown	Satisfactory
High	CO00193	Fall River	Private	Idaho Springs	Fair
High	CO00195	Georgetown	Local Government	Lawson	Fair
High	CO00199	Loch Lomond	Private	Idaho Springs	Fair
High	CO02786	Chase Gulch	Local Government	Black Hawk	Satisfactory
High	CO02852	Guanella	Local Government	Empire	Satisfactory
High	CO00347	Woodland Park	Local Government	Woodland Park	Fair
High	CO00351	Antero	Public Utility	Hartsel	Satisfactory
High	CO00359	Eleven Mile Canyon	Public Utility	Lake George	Satisfactory
High	CO00363	Jefferson Lake	Local Government	Jefferson	Satisfactory
High	CO00372	Montgomery	Local Government	Alma	Satisfactory

Hazard Potential	Federal ID	Dam Name	Owner Type	Downstream Community	Condition
High	CO00342	Tarryall	State	Deckers	Unsatisfactory
High	CO00343	Wagon Tongue	Private	Lake George	Satisfactory
High	CO02677	Spinney Mountain	Local Government	Lake George	Satisfactory
High	CO02939	James Tingle	Local Government	Jefferson	Satisfactory
Significant	CO01249	Green Lake	Local Government	Georgetown	Satisfactory
Significant	CO01188	St. Marys Lake	Private	Idaho Springs	Not Rated
Significant	CO00210	Lower Urad	Local Government	Empire	Satisfactory
Significant	CO00260	Aurora-Rampart	Local Government	Kassler	Satisfactory
Significant	CO00295	J. O. Hill	Private	Deckers	Satisfactory
Significant	CO00312	Wauconda	Private	Sedalia	Fair
Significant	CO01793	Burgess #1	Private	Deckers	Fair
Significant	CO00366	Lake George	Private	Lake George	Satisfactory
Significant	CO01150	Harris Park Estates #1	Local Government	Shaffers Crossing	Satisfactory

Source: USACE National Inventory of Dams (NID)

Figure 9 Dams and Inundation Areas within Jefferson County



4.5.4 Severity

Dams are classified based on their potential impact if they fail, not on the likelihood of failure. The hazard classification depends on factors such as the population living and working within potential inundation areas and the type and density of structures downstream. Development downstream of a dam deemed a significant hazard could cause it to be reclassified as a high-hazard dam, due to the greater potential consequences of failure. **TABLE 12** below details these hazard categories.

Table 12 Dam Hazard Classes

Hazard Category	Loss of Human Life	Economic, Environmental, and Lifeline Consequences
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Likely. One or more are expected.	Yes (but not necessary for this classification)

Source: Colorado E-SHMP

4.5.5 Secondary Hazards

Dam incidents can generate secondary hazards like extensive land shifts and soil instability. Flash floods or dam and levee failures can saturate soils through heavy flooding, undermining their stability and triggering landslides on steep slopes. Such floodwaters also cause erosion, especially during large-scale events like dam breaches, washing away topsoil and sediments from riverbanks and floodplains. Extended flooding saturates the soil, increasing its weight and potentially causing sudden ground collapse or subsidence.

4.5.6 Exposure and Vulnerability

4.5.6.1 Lifelines

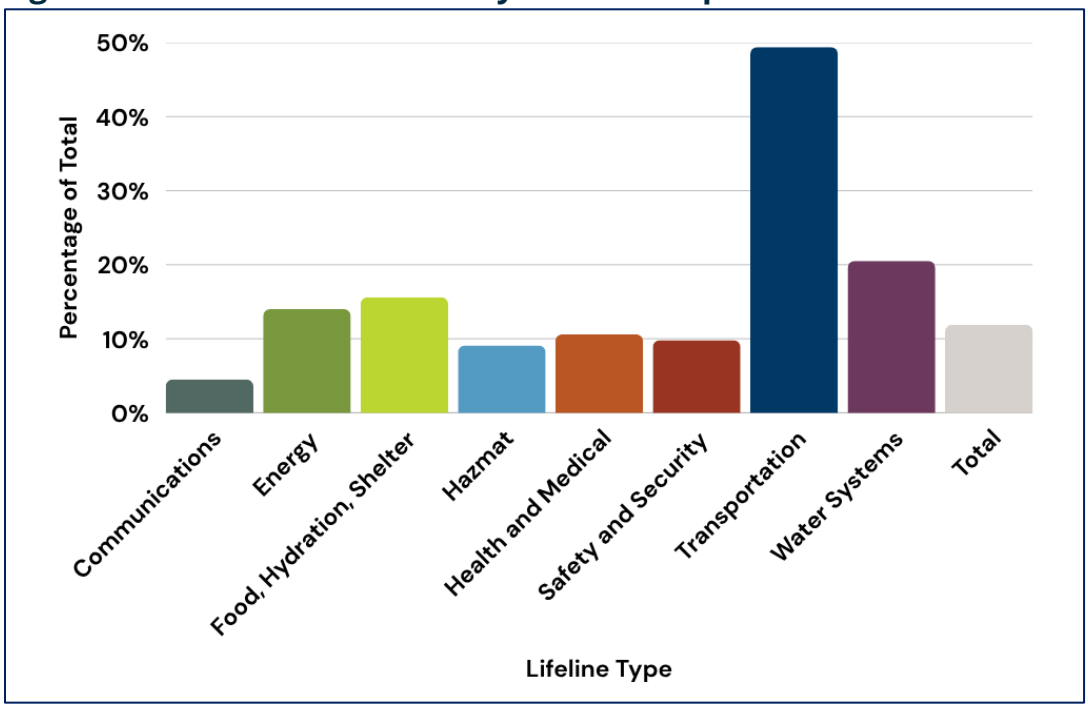
Dam failures can severely disrupt community lifelines by damaging or isolating critical facilities that support essential community functions. Sudden flooding can disable power stations, water and wastewater systems, transportation routes, communication networks, and medical or emergency-response sites. In Jefferson County, safety and security assets account for the greatest total number of exposed lifelines, while transportation lifelines represent the highest percentage of exposure by type. For detailed breakdowns, see the local government annexes.

4.5.6.1.1 Critical Facilities

The key findings from the critical facility lifeline analysis are summarized in the section below and shown in **FIGURE 10**.

- **Communications: 13 facilities** (4.5% of total communication facilities)
- **Energy: 8 facilities** (14.0% of total energy facilities)
- **Food, Hydration, Shelter: 5 facilities** (15.6% of total FHS facilities)
- **Hazardous Materials: 1 facility** (9.1% of total hazardous materials facilities
- **Health and Medical: 10 facilities** (10.6% of total health and medical facilities)
- **Safety and Security: 92 facilities** (9.8% of total safety and security facilities)
- **Transportation: 39 facilities** (49.4% of total transportation facilities)
- **Water Systems: 25 facilities** (20.5% of total water system facilities)
- **Total Community Lifelines: 193 facilities** (11.9% of total lifeline facilities)

Figure 10 Percent of Community Lifelines Exposed to Dam Inundation Areas



4.5.6.1.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 147.2 miles of system infrastructure, 10.4% of the total system network, located within mapped dam-inundation areas. Disruption caused by a dam incident at any point along

these systems could produce cascading impact throughout the county. Systems within the inundation area are summarized by community lifeline category below.

- **Communication**
  - Fiber-Optic Cables: 76.7 miles (9.8%)
- **Energy**
  - Electric Transmission Lines: 27.2 miles (10.8%)
  - Gas Transmission Lines: 2.7 miles (3.4%)
- **Transportation**
  - Major Roadways: 35.2 miles (14.0%)
  - Railway: 5.4 miles (10.4%)

4.5.6.2 People

Dam incidents can threaten public health and safety by causing sudden floods, which may lead to injuries, deaths, and displacement. Floodwater can carry contaminants and sewage, raising the risk of illness. Vulnerable populations, such as older adults and people without reliable transportation, are especially at risk during these emergencies. According to the U.S. Census American Community Survey five-year estimates, 4% of residents in the county have no access to a vehicle, and 29% have access to only one vehicle.

4.5.6.3 Structures

Dam incidents pose significant risks to downstream structures and flood-prone areas. When breaches or failures occur, flooding can devastate buildings, harm personal property, and necessitate costly repairs. Even small problems like overtopping or seepage can cause water intrusion, damage foundations, and promote mold growth. Businesses often face prolonged closures, leading to economic setbacks and disrupted local services.

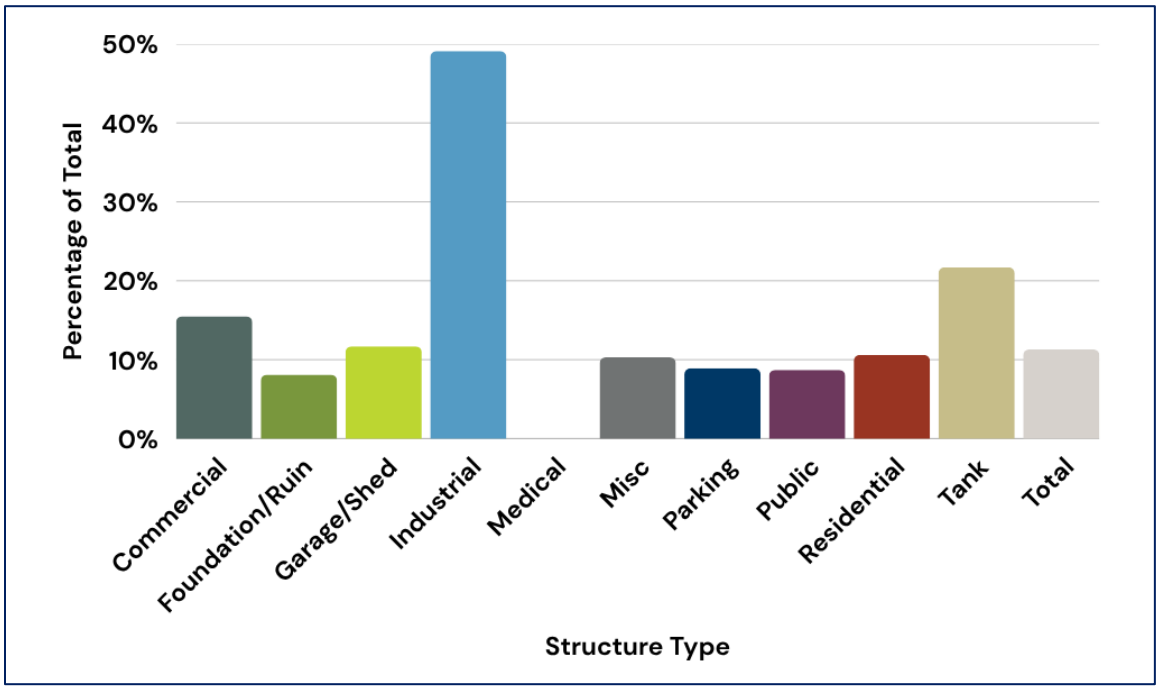
TABLE 13 below outlines the number and types of structures identified within countywide dam inundation zones and **FIGURE 11** displays the percentage of structure count located in dam inundation zones, organized by structure type. In Jefferson County, residential structures account for the greatest total number of structures exposed, while industrial structures represent the highest percentage of exposure by structure type.

Table 13 Structures in Dam Inundation Areas

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	1,238	$2,021,893,693	$1,401,521,681
Foundation/Ruin	38	$553,547,007	$537,043,481
Garage/Shed	15,947	$1,485,762,910	$861,378,799
Industrial	554	$708,051,369	$533,358,168
Medical	0	$0	$0
Misc.	624	$98,873,442	$46,960,674
Parking Structure	4	$0	$0
Public	159	$202,731,974	$152,925,068
Residential	18,479	$10,492,478,228	$7,067,357,298
Tank	183	$23,784,701	$5,877,958
Total	**37,226**	**$15,587,123,326**	**$10,606,423,128**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 11 Percent of Structures Exposed to Dam Inundation Areas



4.5.6.4 Natural, Historic, and Cultural Resources

Severe dam incidents can lead to extensive downstream flooding and the transport of large amounts of sediment and debris, resulting in widespread environmental harm. Additional effects may include contamination from broken septic systems, pollution of drinking water supplies, changes in stream channels, loss of wildlife habitat, and wetland degradation.

4.5.6.5 Local Vulnerability

Populations located downstream of dams and levees are vulnerable to injury or loss of life during an incident if adequate warning and notification systems are not in place. Critical infrastructure, including transportation corridors, utilities, and water systems, is also at risk of flooding or damage from high-velocity and high-volume floodwaters. Sediment and silt mobilization in the South Platte River during a dam or levee failure could degrade water quality and disrupt downstream water uses. Additionally, gaps in coordination between dam and levee owners and Jefferson County, along with insufficient planning, communication, and emergency preparedness, could exacerbate impacts and increase potential losses.

The county has faced challenges due to limited data on dam inundation areas. To address this, the county will coordinate with the state to acquire dam inundation data, enabling the identification of residents at risk from dam incidents and ensuring they are educated about the hazard and notified promptly.

4.5.7 Probability of Future Occurrences

There have been 13 dam incidents in Jefferson County since 1952. This corresponds to a probability of future occurrences rating likely, or an event occurring every 10 to 50 years.

4.5.8 Climate Change Impacts

Climate change is likely to increase the risks of dam incidents by worsening the conditions that lead to them. Extreme weather patterns and altered hydrological cycles lead to more heavy rainfall, rapid snowmelt, and drought conditions, straining these structures. These changing climate patterns could cause overtopping, increased seepage, or structural problems. Particularly, aging infrastructure may struggle to handle the greater volume and intensity of future runoff events, raising the likelihood of failures.

4.6 Drought

4.6.1 General Background

Drought is a regular feature of Jefferson County's climate, marked by insufficient water to meet needs. It can be assessed through precipitation, snowpack, soil moisture, and streamflow deficits, measured over months to years.

Though gradual, droughts are often seen as emergencies because their impacts accumulate over time, affecting various sectors such as agriculture, public water supply, energy production, public health, wildlife, and increasing the risk of wildfires.

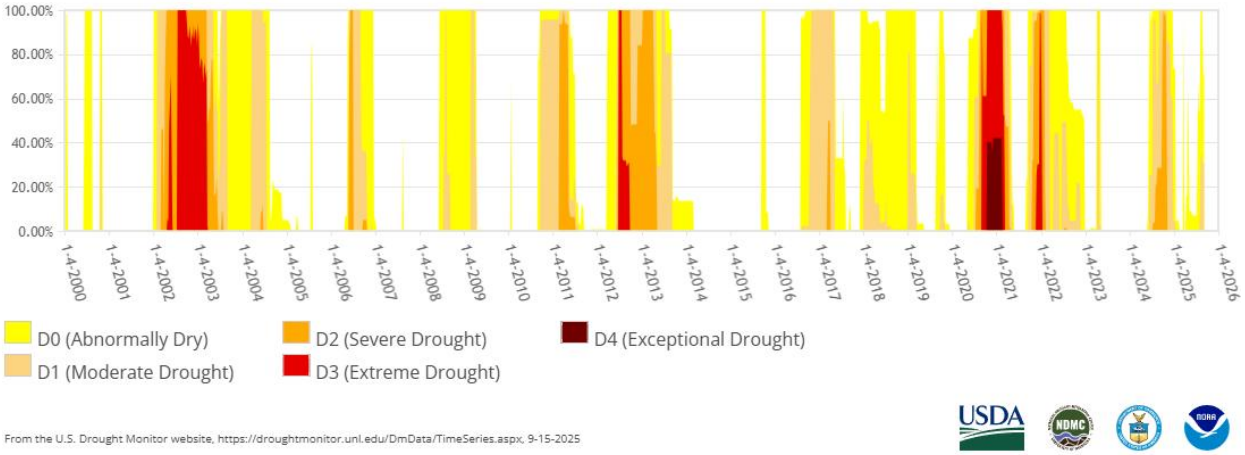
Hydrologic conditions for drought vary by location and water user type. Water providers may use criteria like rainfall, runoff, stored water, or wholesaler supply to define their conditions. Drought complexity is furthered by the management of water rights, which is governed by different legal doctrines.

For more general background information on drought in Colorado, refer to the **2023 COLORADO E-SHMP**.

4.6.2 Past Events

According to records from the U.S. Drought Monitor, during the 1,305-week period from January 1, 2000, through January 1, 2025, all or portions of Jefferson County spent 784 weeks (60% of the time period) in some level of drought, defined as Abnormally Dry (D0) or worse conditions. This period includes 249 weeks of Severe Drought (D2), 91 weeks of Extreme Drought (D3), and 18 weeks of Exceptional Drought (D4). **FIGURE 12** illustrates these periods of extreme and exceptional drought, including the duration and the range of affected county percentages.

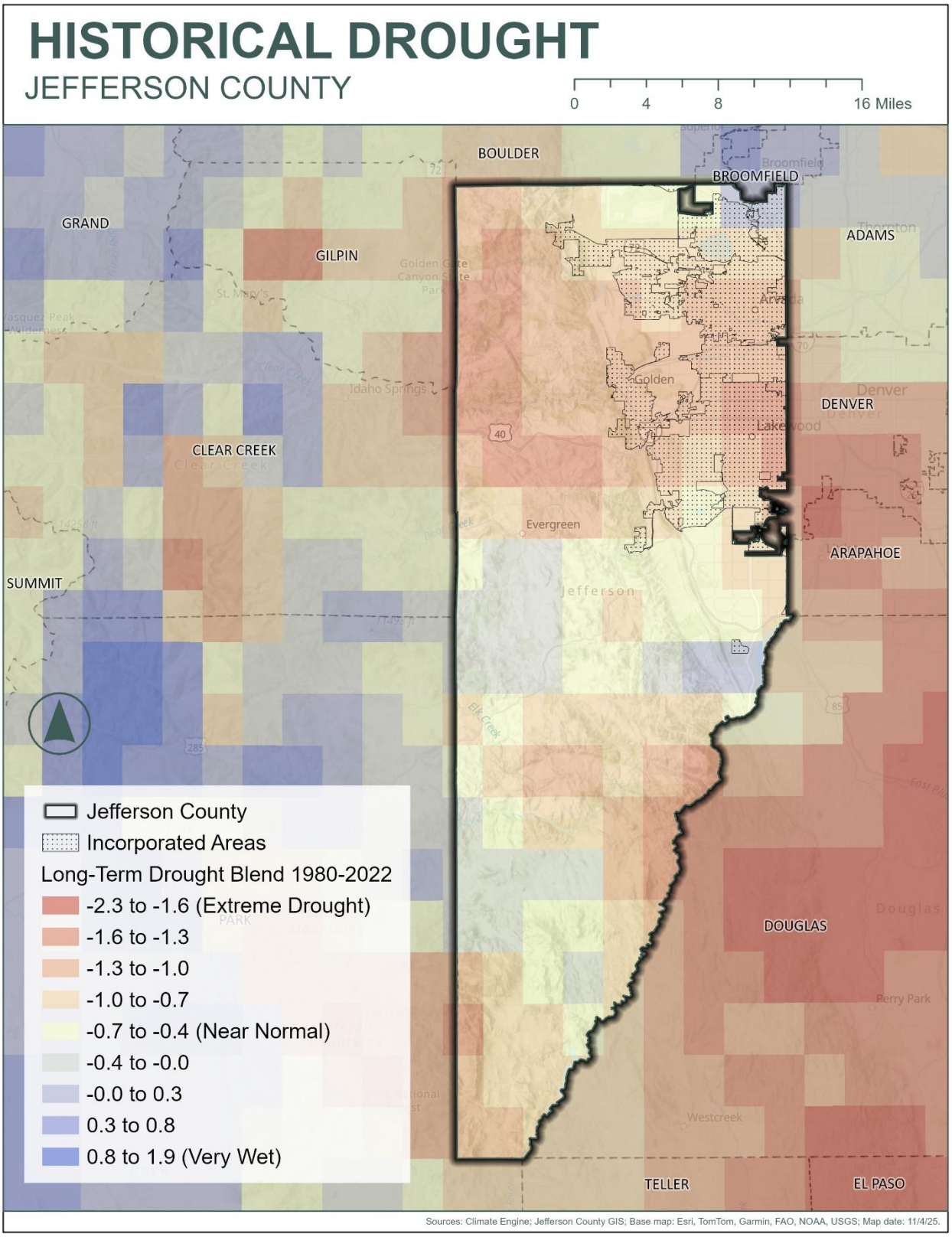
Figure 12 Periods of Drought in Jefferson County, 2000-September 9, 2025



Since 2012, the USDA's Secretary of Agriculture has issued 12 declarations for drought conditions in Jefferson County, nine of which were Fast Track Secretarial disaster designations (see **TABLE 6** in **SECTION 4.2.3**).

FIGURE 13 shows the historical periods of drought in Jefferson County between 1980 and 2022.

Figure 13 Historical Periods of Drought in Jefferson County, 1980-2022



4.6.3 Location

Drought is a hazard that can affect the entire county population through water restrictions, higher water and food prices, reduced air or water quality, or limited access to recreational areas. All areas of the county are susceptible to drought conditions.

4.6.4 Severity

Drought severity depends on the level of moisture shortage, how long it lasts, and the size of the affected area. Potential impacts determine severity categories. As shown in **FIGURE 12** in Past Events and **FIGURE 14** below, Jefferson County has experienced drought in each of these categories.

Figure 14 Drought Categories and Possible Impacts

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

4.6.5 Secondary Hazards

Drought conditions can cause soil compaction (ground subsidence), reducing its ability to absorb water and increasing susceptibility to flash flooding and erosion. As droughts lengthen, their impacts intensify, leading to the depletion of reservoir supplies and declining water levels in groundwater basins.

Wildfires are frequently connected to drought as a secondary hazard. Extended dry spells dehydrate vegetation, increasing the likelihood of ignition as drought continues. Drought accelerates the drying of dead and fallen trees, turning them into prime fuel for fires. It also stresses trees and plants, making them more susceptible to invasive species like the emerald ash borer, which further amplifies fuel sources for wildfires. Notably, extreme and exceptional drought levels often overlap. For instance, both categories were recorded from 2002 to 2024, with similar drought periods from 2012 to 2013 and 2021 to 2022, each heightening the risk of cascading hazards such as wildfires.

4.6.6 Exposure and Vulnerability

4.6.6.1 Lifelines

Drought conditions can seriously impact on the county's essential services, disrupting infrastructure that supports daily life. Supply systems face increased pressure as water resources decline, resulting in restrictions for residents, businesses, and farmers. Transportation may be affected due to reduced water for road maintenance or heightened wildfire risks that threaten key routes. Low reservoir levels can hamper hydroelectric power generation, while public health risks rise from limited access to clean water and increased contaminants. Emergency services often face higher demands during drought-related events like wildfires and heatwaves, stretching their capacity. These effects highlight how drought can threaten the resilience and operation of the county's critical infrastructure, putting communities and vital resources at greater risk.

4.6.6.2 People

Drought can severely disrupt access to essential water supplies for homes, businesses, and farms, affecting daily activities such as hygiene, food production, and overall health. These effects are particularly harsh for individuals with access and functional needs, such as older adults, people with disabilities, those with

chronic illnesses, and those facing language or financial obstacles. System barriers can hinder access to water, assistance, or recovery from long-lasting disruptions. An extended drought also leads to stress, mental health problems, and economic hardship, underscoring its serious effects on both individuals and communities.

4.6.6.3 Structures

Drought can impact the durability and stability of structures. As soil moisture drops, ground subsidence and compaction can weaken building foundations, leading to cracks or shifts that threaten structural integrity. Extended droughts can dry out landscaping and surrounding vegetation, increasing the risk of wildfires, especially in rural or semi-urban areas. Water shortages may also restrict essential maintenance, like cleaning or cooling systems, which accelerates deterioration and shortens the lifespan of materials. Additionally, roads and bridges could experience extra strain because of increased wildfire risks and reduced water availability for dust suppression and maintenance. These cumulative effects highlight how drought harms the natural environment and daily life and jeopardizes the safety and resilience of built environments.

4.6.6.4 Natural, Historic, and Cultural Resources

Drought exerts significant stress on natural ecosystems, reducing water availability in rivers, wetlands, and forests, disrupting habitats and threatening local plants and animals. Lower soil moisture and falling groundwater levels can accelerate the loss of native plant species and weaken wildlife populations, while more wildfires cause further damage to fragile environments. Historic buildings and cultural landmarks are also at risk; extended drought can cause the soil beneath foundations to shrink and shift, leading to structural damage like cracks or instability. Limited water resources may hinder essential preservation efforts, accelerate deterioration, and increase wildfire risk, threatening irreplaceable sites and artifacts. These impacts highlight how drought endangers natural heritage and cultural identity through historic structures, emphasizing the need for vigilant protection and adaptive management.

4.6.6.5 Local Vulnerability

The primary drought-related concern in Jefferson County is the increased risk of wildfire. Prolonged dry conditions elevate fire danger and strain firefighting resources, particularly in rural areas of the county where water supplies and fire

hydrants are limited or not readily accessible. These conditions can hinder suppression efforts and increase the potential for larger, more severe wildfires.

4.6.7 Probability of Future Occurrences

The Planning Team identified the future probability of a drought as highly likely, expected to occur every decade at a minimum, if not more frequently. This pattern is reinforced by the consistent USDA disaster declarations issued, indicating that droughts of sufficient severity to require aid are likely to continue in the future.

4.6.8 Climate Change Impacts

Climate change is worsening drought conditions in Jefferson County by causing hotter, drier weather patterns, decreasing snowpack, and increasing evaporation rates. According to the Jefferson County Climate Action Plan, average temperatures in Colorado have increased by approximately 2°F since 1900, resulting in earlier snowmelt, lower streamflows, and reduced reservoir levels. These warming trends put additional stress on local water supplies, dry out soil, and extend drought periods that affect agriculture, ecosystems, and water availability for residents. The plan also emphasizes that under harsher climate scenarios, annual economic losses due to drought in Jefferson County could rise from approximately $210,000 to as much as $1.8 million, highlighting the increasing financial and environmental risks posed by a warming, drying climate.

4.7 Earthquake

4.7.1 General Background

An earthquake is caused by the sudden release of energy in the Earth's crust, usually due to tectonic plate movement. This release generates seismic waves felt as ground tremors. Earthquakes range from minor shakes to significant events that damage infrastructure and cause loss of life. They mainly occur along fault lines but can happen away from these boundaries due to fault reactivation or human activities like mining or extraction.

For more general background information on earthquakes in Colorado, refer to the **2023 COLORADO E-SHMP**.

4.7.2 Past Events

According to the United States Geological Survey (USGS), from 1962 to 2025 four earthquake epicenters with a magnitude greater than 2.5 have occurred within

Jefferson County's boundary. These events are summarized in **TABLE 14**. The most significant recorded event had a magnitude of 3.5 and occurred on September 29, 1965, 0.6 miles west-southwest of Arvada.

The USGS reported that the largest magnitude earthquake within a 30-mile radius of the county was 5.5, which occurred 4.3 miles southeast of Lochbuie on August 9, 1967.

Table 14 Earthquake Events (2.5 M+) within and near Jefferson County (1962-2025)

Magnitude	Location	Date
M 3.2	7 km NNW of Aetna Estates, Colorado	December 4, 1962
M 3.0	1 km NW of Northglenn, Colorado	February 16, 1965
M 3.5	1 km WSW of Arvada, Colorado	September 29, 1965
M 3.8	8 km NNE of Aurora, Colorado	November 11, 1965
M 3.5	11 km S of Lochbuie, Colorado	November 11, 1966
M 4.3	7 km SE of Brighton, Colorado	April 10, 1967
M 4.5	9 km SSE of Brighton, Colorado	April 27, 1967
M 5.5	7 km SE of Lochbuie, Colorado	August 9, 1967
M 5.2	4 km NE of Derby, Colorado	November 27, 1967
M 2.9	5 km ESE of Commerce City, Colorado	June 10, 1978
M 2.9	2 km N of Divide, Colorado	January 6, 1979
M 2.8	4 km ENE of Denver, Colorado	March 24, 1981
M 4.3	3 km NE of Northglenn, Colorado	April 2, 1981
M 2.8	Rock Burst - 2 km S of Aspen Park, Colorado	November 2, 1981
M 2.8	6 km ENE of Derby, Colorado	March 11, 1982
M 2.8	Colorado	September 18, 1982
M 2.5	4 km NW of Northglenn, Colorado	February 25, 1984

Magnitude	Location	Date
M 2.5	4 km WSW of Indian Hills, Colorado	September 21, 1986
M 2.5	1 km WNW of Twin Lakes, Colorado	November 8, 1989
M 4.0	9 km NE of Larkspur, Colorado	December 25, 1994
M 2.7	8 km SE of Westcreek, Colorado	January 1, 1997
M 2.9	8 km SE of Westcreek, Colorado	January 1, 1997
M 3.3	8 km SE of Westcreek, Colorado	January 18, 1997
M 2.7	8 km SE of Westcreek, Colorado	April 4, 1998
M 3.1	6 km WNW of Woodland Park, Colorado	July 22, 2001
M 2.9	29 km WNW of Westcreek, Colorado	February 26, 2008
M 2.5	2 km ESE of Georgetown, Colorado	October 24, 2020
M 2.7	7 km SE of Erie, Colorado	June 13, 2025

Source: USGS

4.7.3 Location

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 15.** The fault runs through sparsely developed sections of western Arvada, Golden, western Lakewood, and just east of Morrison.

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.

It is important to recognize that earthquakes with epicenters outside of Jefferson County can still impact the area, as seismic waves from large earthquakes can travel significant distances. While not directly centered in Jefferson County, these events could still pose risks to residents, buildings, and critical infrastructure. **FIGURE 15** displays historical earthquakes that have occurred in the region surrounding Jefferson County.

The peak ground acceleration (PGA) data reveal that the county is situated in an area of low seismic activity with uniformity in shaking intensity across the majority of the county, except the southwest side of the county, which has moderate shaking intensity, as illustrated in **FIGURE 16** below.

Figure 15 Jefferson County Historical Earthquakes

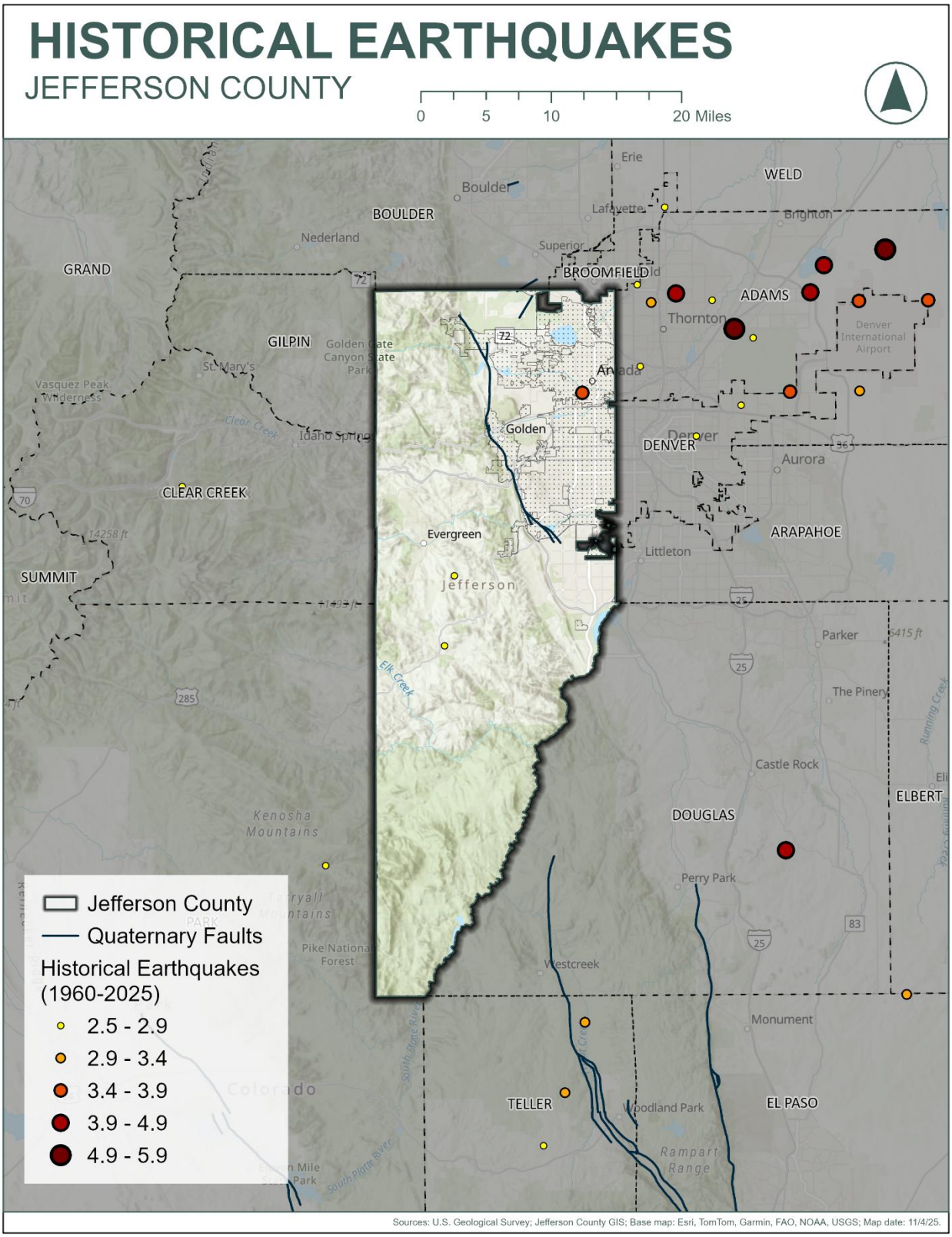
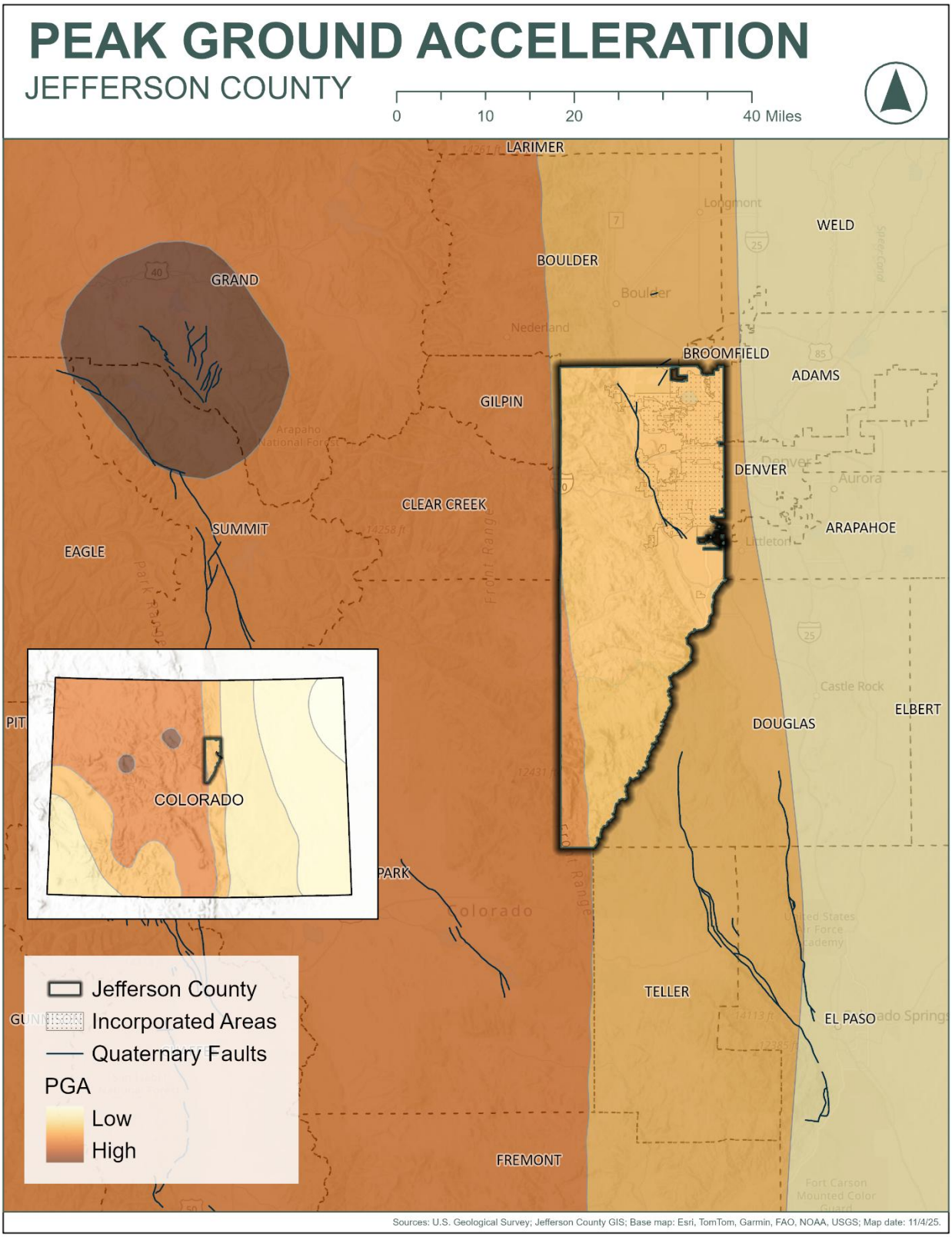


Figure 16 Jefferson County Peak Ground Acceleration (PGA)



4.7.4 Severity

Earthquakes range from minor tremors that are undetectable by humans to major events that impact large areas. Most events in Colorado have magnitudes between 2.5 and 4.5, causing little damage. According to the U.S. Geological Survey (USGS), eastern Colorado is nearly seismically inactive, with only a few epicenters located in the Arkansas and Platte River valleys.

Most earthquakes in Colorado's history have been centered west of the Rocky Mountain Front Range. As noted in the CO-ESHMP, the 2023 FEMA and USGS Annualized Earthquake Losses study shows that Jefferson County and Montezuma County have the highest loss estimates related to earthquakes, with reports of $4.8 and $8.3 billion in estimated losses. In a worst-case scenario, the potential severity of earthquakes could be catastrophic, leading to widespread property damage, facility shutdowns lasting more than two weeks, and multiple fatalities.

Jefferson County's most recent notable earthquake was a 3.5 magnitude, while a nearby area experienced a 5.5 magnitude quake; neither caused significant damage. **TABLE 15** shows the magnitude and impacts of an earthquake.

Table 15 Earthquake Magnitude and Intensity Scale

Scale	Intensity	Description of Effects	Richter Scale Magnitude
I	Not Felt	Detected only on seismographs.	
II	Weak	Some people feel it.	< 4.2
III	Weak	Felt by people resting; like a truck rumbling by.	
IV	Light	Felt by people walking.	
V	Moderate	Sleepers awake; church bells ring.	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4

Scale	Intensity	Description of Effects	Richter Scale Magnitude
VII	Very strong	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	Severe	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Violent	Some houses collapse; ground cracks; and pipes break open.	< 6.9
X	Extreme	Ground cracks profusely; many buildings are destroyed; liquefaction and landslides are widespread.	< 7.3
XI	Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables are destroyed; general triggering of other hazards.	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: USGS

4.7.5 Secondary Hazards

While unlikely, the most probable site for fault rupture is along the Golden Fault, near Golden at the foothills' base. Such a rupture could threaten homes and highways in west Golden. Additional secondary hazards include landslides and rockfalls in the vicinity, which might harm transportation routes, properties, and result in injuries or fatalities. Earthquakes could also generate large waves called

seiches in lakes, potentially affecting reservoirs like Chatfield, Strontia Springs, and Cheesman, and possibly damaging the Chatfield marina and nearby property.

4.7.6 Exposure and Vulnerability

4.7.6.1 Lifelines

Earthquakes can significantly affect all lifelines. Even slight damage can cause disruptions in food, hydration, and shelter by displacing people, causing water leaks, or contaminating drinking water, which impacts the water systems lifeline. Communications, energy, and transportation infrastructure may experience minor issues or total shutdowns due to damaged systems, broken bridges, or blocked roads. Building damage or transportation problems might affect health and medical services, requiring large-scale fatality management. Safety and security could also be at risk if buildings or equipment are damaged, and hazardous materials might be released from facilities, pipelines, or during transit.

Based on a 2,500-year probabilistic model of a 5.0 magnitude earthquake, FEMA's Hazus loss estimation tool calculates minimal impacts in the area. It is important to note that the largest historical earthquake to occur within a 30-mile radius of Jefferson County was rated 5.5 magnitude. The full report is available in the **HMP APPENDICES** of this HMP, with a summary provided below.

- Safety and Security: According to the Hazus software, all lifelines will be at 96% functionality or greater one week after an earthquake. This includes 6 Hospitals (780-bed capacity), 211 Schools, 6 Emergency Operation Facilities, 22 Police Stations, and 66 Fire Stations.
- Transportation (Highway, Railway, Bus, and Airport): Approximately $10.5 million in estimated economic losses to transportation systems.
- Utility Systems (Potable and Wastewater, Natural Gas, Electrical Power, and Oil Systems, Communication): Approximately $112.18 million in estimated economic losses to utility systems.

4.7.6.2 People

An earthquake can greatly affect people's lives both instantly and over the long term. Intense ground shaking can cause buildings to collapse, resulting in injuries, fatalities, and the displacement of families. Critical services such as utilities, communications, healthcare, and transportation may be disrupted, limiting access to essential needs and emergency assistance. These impacts can be especially

severe for individuals with access and functional needs, including older adults, people with disabilities, people with chronic medical conditions, and those with limited transportation or communication access, who may face added challenges during evacuation, sheltering, and recovery. Even minor earthquakes can cause emotional stress, financial hardship, and prolonged recovery, particularly for these populations.

The Hazus model predicts that approximately 386 households will be displaced by the earthquake, with 172 individuals expected to seek temporary public shelter. In the most severe scenario (a 2:00 PM event), it projects that 106 people will need medical care without hospitalization, 14 will require non-life-threatening hospital stays, one will need a life-threatening hospital stay, and there will be two fatalities.

4.7.6.3 Structures

Several factors affect property damage during earthquakes, such as age, building type, and construction materials used. Historic structures are at greater risk. Damage can vary from small cracks to making buildings uninhabitable. Estimating potential damage is complicated because of many variables. Modern or retrofitted buildings tend to be more resistant to seismic forces, but significant damage can still happen in very strong earthquakes. Structures built before current building standards are especially vulnerable.

Based on the FEMA Hazus model, a 5.0 magnitude earthquake in Jefferson County could produce approximately 163,000 tons of debris and cause $99.94 million in building-related damages. Around 4,996 buildings are projected to experience at least moderate damage, accounting for over 2% of the structures in the area. Among these, about 67 buildings might suffer damage beyond repair, with most of the vulnerable structures being single-family homes.

4.7.6.4 Natural, Historic, and Cultural 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.

4.7.6.5 Local Vulnerability

While severe earthquakes are unlikely in Jefferson County, seismic activity could still cause damage. The County Emergency Operations Center (EOC) is situated on a fault line and could be affected by shaking. Additionally, earthquakes have the

potential to disrupt utility and transportation infrastructure throughout the county, which may hinder the delivery of essential services.

4.7.7 Probability of Future Occurrences

Since 1962, Jefferson County has experienced four earthquakes with a magnitude of 2.5 or greater, according to the USGS. Past events indicate a probability of future occurrences as being unlikely. This means the county should expect an earthquake of magnitude 2.5 or greater every 10 to 50 years. Predicting the exact timing or location of future earthquakes is impossible, but a high-magnitude earthquake in the region could affect the county.

4.7.8 Climate Change Impacts

Earthquakes result from the movement of tectonic plates, which are not affected by surface-level weather or climate patterns. Consequently, changes in climate are unlikely to influence the frequency, location, or severity of future earthquake events. According to NASA, "most quakes occur far beneath Earth's surface, well beyond the influence of surface temperatures and conditions. Additionally, we know the statistical distribution of earthquakes is approximately equal across all types of weather conditions."[3]

4.8 Extreme Heat

4.8.1 General Background

Definitions of extreme heat events, also called heat waves, vary depending on the source, data availability, time of extreme heat occurrence, and the type of heat metric utilized. Extreme heat is most dangerous when temperatures remain high for multiple days, referred to as an extreme heat event. According to the Colorado Department of Public Health and Environment (CDPHE), extreme heat is generally defined as (1) two or three consecutive days at or above 97°F; or (2) multiple days when the temperature is 10 degrees or more above the average high temperature for the region. The National Weather Service (NWS) defines a heat wave as one or more days of unseasonably hot weather in a relatively short time.

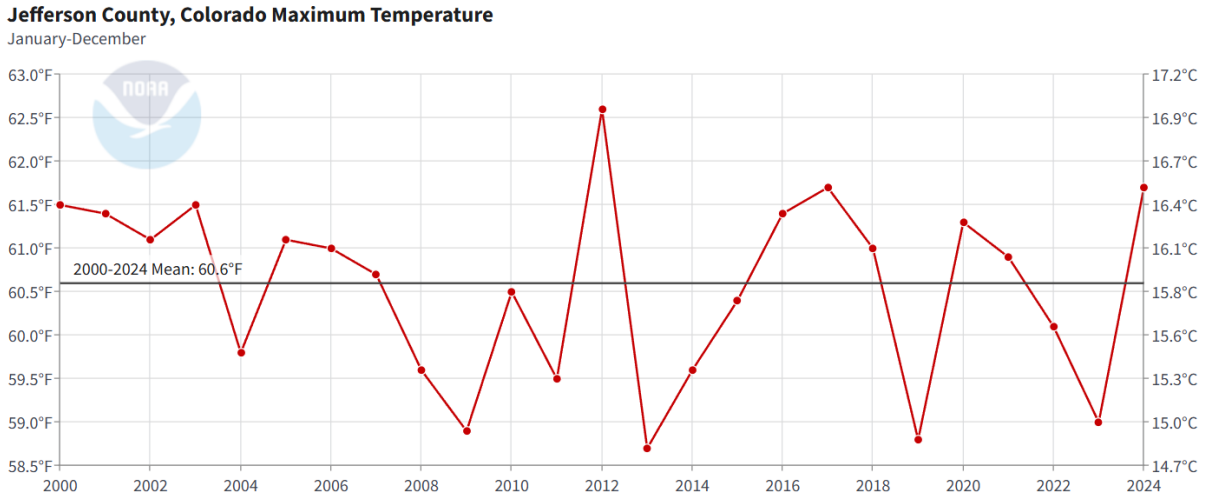
For more general background information on extreme heat in Colorado, refer to the **2023 COLORADO E-SHMP.**

[3] CAN CLIMATE AFFECT EARTHQUAKES, OR ARE THE CONNECTIONS SHAKY? - NASA SCIENCE

4.8.2 Past Events

According to records collected by the National Centers for Environmental Information (NCEI), Jefferson County's average annual maximum temperature is 60.6°F (see **FIGURE 17**). The Planning Team noted experiencing heat waves every summer.

Figure 17 Jefferson County Annual Maximum Temperature



Given the topography and how communities have been built, temperatures across the county differ. The Western Regional Climate Center (WRCC) reports data summaries from weather stations around the county. **TABLE 16** contains temperature summaries related to extreme heat for the station.

Table 16 Maximum Temperature Data from Jefferson County Weather Stations

Station	Average Annual Maximum Temperature	Daily Extreme High Temperature	Average Annual # of Days Max. Temp > 90°F
Lakewood[1] (COOP ID: 054762)	63.7°F	104°F June 27, 1994	25.7 days
Ralston Reservoir[2] (COOP ID: 056816)	63.6°F	102°F June 26, 2012	30 days
Evergreen[3] (COOP ID: 052790)	60.6°F	97°F June 26, 2012	4.6 days

Source: WRCC; (1) Period of Record: June 28, 1962-April 24, 2025; (2) Period of Record: May 1, 1978-September 18, 2025;(3) May 24, 1961–September 18, 2025

4.8.3 Location

Temperature hazards are inherently regional, impacting much of the planning area simultaneously, though effects vary by location. The county, situated along the Rocky Mountains' foothills, includes west Denver metro municipalities such as Arvada, Golden, Lakewood, Lakeside, Morrison, Mountain View, Westminster, and Wheat Ridge. These areas share a temperate climate like the broader Denver metro area. Due to their urban development, they are more prone to extreme heat than the higher elevations in the county.

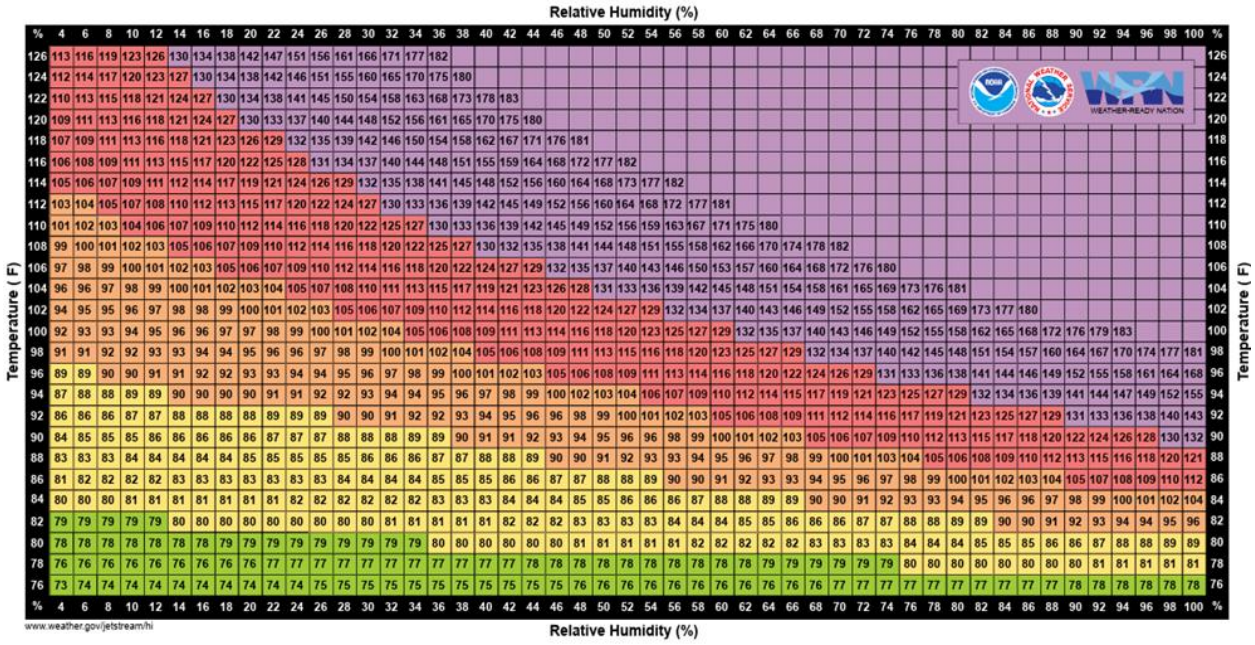
Urbanized parts of the Denver Metro Area can experience localized hot spots, where surfaces such as pavement and roofs become significantly hotter than the surrounding air, an effect known as the urban heat island. These surfaces also trap heat, causing high temperatures to linger even as the air cools. According to the U.S. Environmental Protection Agency (US EPA), “the annual mean air temperature of a city with one million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings. However, on a clear, calm night, the temperature difference can be as much as 22°F”. Colorado’s climate often experiences significant temperature variations between day and night. This nighttime cooling helps alleviate heat stress and may reduce the risk of extreme heat conditions.

4.8.4 Severity

The severity of an extreme heat event depends on multiple factors, not just weather conditions. While the departure from typical temperatures is the initial trigger, exposure levels and access to cooling options can significantly increase the risk, potentially deadly. Building characteristics and the availability of air conditioning or other cooling methods also play vital roles. Vulnerable populations, such as those with health issues or working in construction or agriculture, can be affected even when temperatures aren't extremely high.

When issuing alerts for extreme heat, the National Weather Service uses the Heat Index to show the apparent temperature, which combines air temperature and humidity to reflect how hot it feels (**Figure 18**). The Heat Index table assumes shady conditions with a light breeze. In areas with low humidity, like Colorado, the apparent temperature can be lower than the actual air temperature. For example, if the air temperature is 100°F and the relative humidity is 15%, the heat index will be 96°F.

Figure 18 National Weather Service Heat Index



Classification	Heat Index/Apparent Temperature	General Affect on People in High Risk Groups
Extremely Hot	≥130°F	Heat/Sunstroke HIGHLY LIKELY with continued exposure
Very Hot	105°F - 129°F	Sunstroke, heat cramps, or heat exhaustion LIKELY, and heatstroke POSSIBLE with prolonged exposure and/or physical activity
Hot	90°F - 104°F	Sunstroke, heat cramps, or heat exhaustion POSSIBLE with prolonged exposure and/or physical activity
Very Warm	80°F - 89°F	Fatigue POSSIBLE with prolonged exposure and/or physical activity

4.8.5 Secondary Hazards

Secondary hazards of extreme heat include the worsening of drought due to increased evaporation and reduced water availability, which further exacerbates drought conditions. Additionally, higher wildfire frequency and severity occur as drying vegetation raises the risk of ignition.

4.8.6 Exposure and Vulnerability

4.8.6.1 Lifelines

Extreme heat events can increase the risk of power outages, impacting the energy lifeline. The main consequence for critical facilities and community infrastructure is

operational downtime due to power disruptions. The overall severity depends on how quickly electricity is restored and normal operations are resumed. These events can also affect the transportation lifeline by damaging infrastructure and causing service interruptions. According to the CO E-SHMP, concrete pavements have experienced "blowouts or heaves" on local highways and busier interstate routes. Blowouts happen when pavements expand and cannot fit within their designated spaces, causing sections to lift several inches. This can lead to vehicle accidents initially and may result in traffic lanes or road closures until repairs are completed.

4.8.6.2 People

Extreme heat presents significant health dangers, particularly for vulnerable groups such as older adults, children, outdoor workers, homeless populations, and individuals with preexisting conditions like heart disease, respiratory issues, or diabetes. People with access and functional needs, including those with disabilities, those dependent on electricity for medical devices, individuals with limited mobility or transportation, and those facing communication or caregiving barriers, may be disproportionately impacted, as they often have more difficulty accessing cooling, receiving alerts, evacuating, or reaching medical services. Without adequate cooling, these groups are at even higher risk due to housing insecurity, power outages, or limited resources. Extended periods of high temperatures can lead to heat exhaustion, heatstroke, dehydration, and worsening cardiovascular and respiratory health. Long heat waves also burden healthcare systems, increase emergency visits, and affect low-income urban areas most severely, where the heat island effect elevates temperatures.

4.8.6.3 Structures

Extreme heat can compromise structures and built environments. Extended exposure to high temperatures accelerates the deterioration of asphalt, concrete, and roofing materials, leading to cracks, warping, or softening. Buildings and infrastructure not built for sustained heat may face insulation, cooling systems, and electrical components failures, raising indoor overheating and mechanical failure risks. Moreover, transportation infrastructure, including roads, bridges, and railways, may suffer damage from thermal expansion, potentially disrupting mobility and emergency services.

4.8.6.4 Natural, Historic, and Cultural Resources

Extreme heat can greatly affect Jefferson County's natural, cultural, and historic assets. Long-lasting high temperatures may strain local ecosystems, raising drought risks, causing plant die-offs, and increasing wildfire danger. Sensitive habitats and species, including farmland, might face threats from altered water supplies and heat stress. Jefferson County has hundreds of square miles of parks and open space that provide habitat for various species valuable to residents and visitors, and that are vulnerable to extreme heat. Extreme heat events may cause species to shift their habitats in elevation and latitude, and extended periods of extreme heat can stress both flora and fauna. 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.

4.8.6.5 Local Vulnerability

Jefferson County faces risks from power failures and energy outages during extreme heat events. Vulnerable populations, particularly those who rely on medical equipment, are especially at risk during these conditions.

4.8.7 Probability of Future Occurrences

Looking ahead, Jefferson County is expected to see an increase in the frequency and severity of extreme heat events. Data from recent decades show these events are happening more often, lasting longer, and reaching higher peak temperatures during summer. Future heat risks vary between mountain communities and plains areas. With their higher elevation and cooler average temperatures, mountain communities tend to experience fewer and less intense heatwaves. In contrast, plains communities face a greater threat of extended hot periods and are highly likely to encounter more extreme heat episodes in the future.

4.8.8 Climate Change Impacts

Climate change is leading to more frequent, longer, and severe heat events in Jefferson County. According to the Jefferson County Climate Action Plan, statewide average temperatures have already increased by about 2°F since 1900, causing hotter days and more episodes of extreme heat. These temperature increases pose greater health risks, particularly for older adults, children, outdoor workers, and residents lacking cooling or proper housing. Extreme heat also worsens air quality by boosting ground-level ozone, strains energy supplies due to higher cooling

needs, and harms water and soil quality. As heat waves grow more frequent, the county faces increasing challenges in protecting vulnerable groups, safeguarding public health, and strengthening critical infrastructure against prolonged high temperatures.

4.9 Flood

4.9.1 General Background

Flooding happens when water inundates land that is normally dry. Floodplains, which are low-lying regions near rivers, can naturally store and slow down excess water flow, helping to reduce flooding downstream. However, constructing buildings in these zones increases their risk during flood events.

Types of flooding in Jefferson County include:

- River flooding: Overflow from prolonged rainfall, rapid snowmelt, or dam releases affecting large areas, especially floodplains.
- Flash flooding: Sudden, intense rainfall overwhelms drainage systems (both natural and human constructed) with little warning.
- Snowmelt flooding: Rapidly melting snow overwhelms rivers, streams, and drainage systems, typically in late winter or early spring. Rain-on-snow events also cause excess runoff.
- Urban flooding: Heavy rainfall overburdens stormwater systems, leading to localized flooding in streets and basements.

For more general background information on flood hazards in Colorado, refer to the **2023 COLORADO E-SHMP.**

4.9.2 Past Events

The NCEI database documented 55 flood events across the county from 1996 to 2023. The areas with the most reported incidents include the communities of Morrison, Evergreen, and Lakewood within the Bear Creek Basin, flooding on Clear Creek in Golden, and Ralston Creek in Arvada and Wheat Ridge. Three fatalities were reported as a result of flash flood events.

The following is a summary of notable historic flood events in Jefferson County:

- **1896 "Black Friday" Flood (Bear Creek)** – The largest flood in county history, destroying bridges, farms, and infrastructure from Evergreen

through Golden. At least 29 people were killed, and the flood reshaped Bear Creek's floodplain.

- **1933 and 1938 Bear Creek Floods** – Severe flooding struck Morrison; the 1938 event was particularly damaging to homes and transportation routes.
- **1965 South Platte Basin Flood** – Widespread flooding across the region also impacted the Jefferson County portion of the basin, damaging roads, bridges, and culverts.
- **June 1997– July 2000 Flash Floods –** The NCEI database records show multiple flash floods near Golden, Morrison, and Evergreen caused by intense summer thunderstorms.
- **1998 Buffalo Creek Flood -** Post-wildfire runoff destroyed sections of County Road 126 and washed out culverts.
- **July 28, 2003 – Flash Flood Event (Morrison Area) -** Heavy rains over the foothills caused flooding along Bear Creek and its tributaries. Estimated damages of $250,000 to roads, culverts, and private property.
- **July 8, 2011 – Flash Flood (Evergreen and Morrison)** – Heavy rainfall event; Up to 2.5 inches of rain in one hour. The heavy rainfall caused flooding on Highway 74, debris flows, and minor property damage. The NCEI database records report as estimated $50,000 in property damages.
- **September 11–15, 2013 – Major Regional Flood** – A widespread event impacting the Front Range including Jefferson County. Locations in the county impacted include Ralston, Leyden, and Bear Creek basins saw stream overtopping and dam spillway overflow. Leyden Dam's discharge peaked at over 1,300 cubic feet per second, well above design flow. Dozens of roads were closed, and multiple homes and businesses were flooded throughout the Front Range region.
- **May–June 2015 – Prolonged Rainfall and Urban Flooding** - At least five separate flash flood reports in Wheat Ridge, Golden, and Arvada in May 2015, with combined property losses exceeding $250,000. Nearly annual rainfall totals fell in less than two months between May and June 2015. Widespread basement flooding, minor street flooding, and saturated soil leading to structure damage was reported from the events.
- **July 24, 2018 – Flash Flood (Evergreen and Golden)** - Torrential rains (2–3 inches in one hour) caused flash flooding in canyon areas and along

Highway 74. The NCEI database lists $60,000 in property damage from the event.

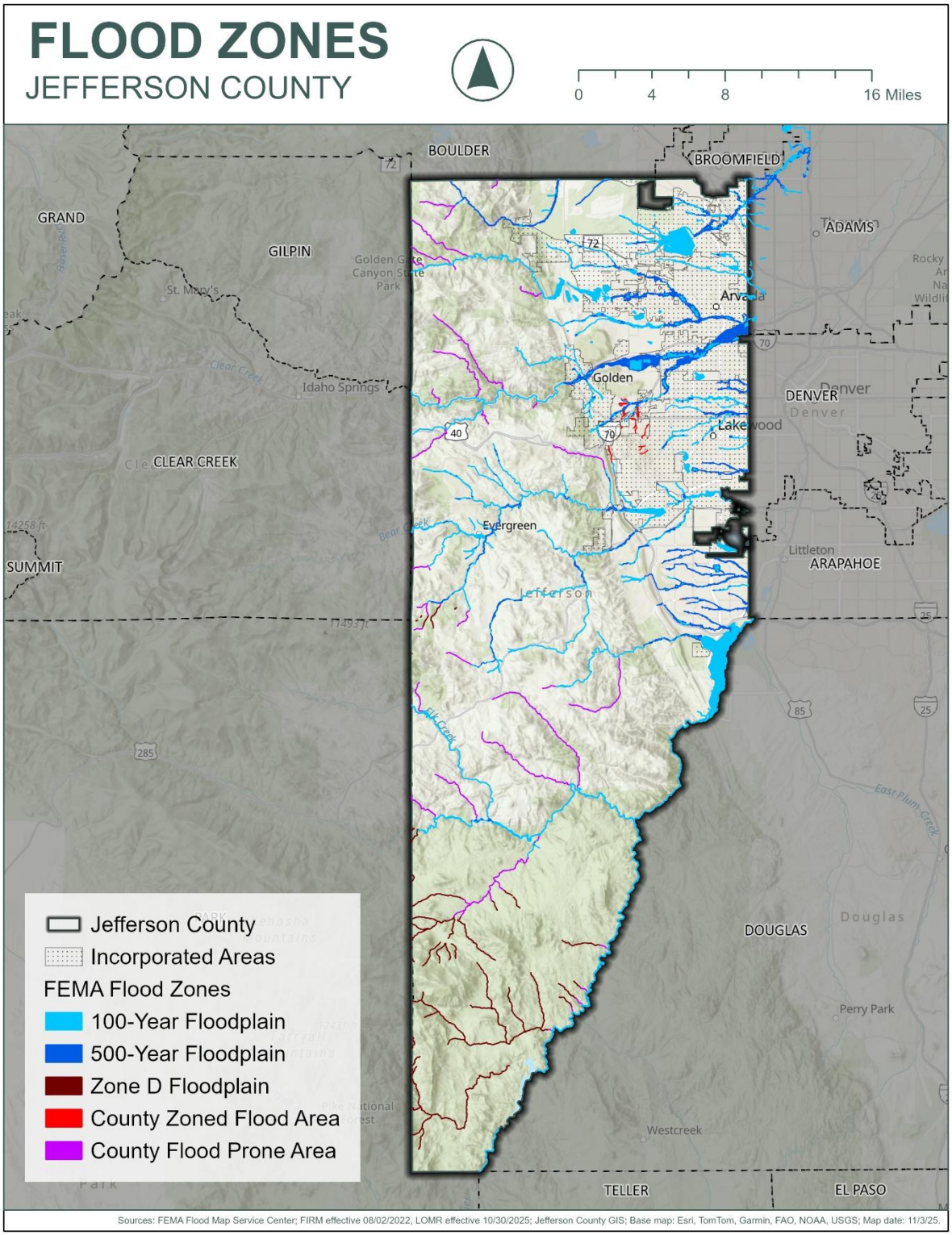
- **July 4, 2021 – Flash Flood (North Golden & Clear Creek)** – A monsoon-driven thunderstorm flooded bike paths and low-lying areas near Clear Creek. Estimated $25,000 damages, primarily to recreation areas.
- **July 31, 2023 – Flash Flood (Golden–Lookout Mountain area)**- 2–4 inches of rainfall over a few hours. The heavy rainfall resulted in mudslides and localized flooding along U.S. 6 and Highway 93. The NCEI reports estimated damages to range from $50,000 to $100,000.

4.9.3 Location

The 100-year and 500-year floodplains are areas designated based on their likelihood of experiencing significant flooding each year. A 100-year floodplain has a 1% annual chance of flooding, and a 500-year floodplain has a 0.2% annual chance. It is important to note that these probabilities do not mean that floods occur only once every 100 or 500 years but instead reflect statistical averages that an event of this magnitude occurs.

Jefferson County is crossed by several water systems that present potential flood risks to structures and communities within the area. There are several major watersheds in the county, including: Bear Creek, Clear Creek, South Platte River, Turkey Creek, and Ralston Creek. The locations of FEMA and local floodplain areas are shown in **FIGURE 19**. Also shown are areas within Zone D (possible but undetermined flood risk), and County Flood-Prone Areas and Zoned Flood Areas, detailed further below.

Figure 19 FEMA Flood Zones



4.9.4 Severity

Flood severity is typically described using terms like "100-year flood" and "500-year flood," which reflect statistical likelihoods rather than the actual interval between events. A 100-year floodplain usually covers areas with a greater probability of flooding, and development in these zones is generally regulated to minimize damage. Although 100-year floods often cause considerable damage, 500-year floods can be more destructive due to their rarity and severity. Small flood events may lead to temporary disruptions, but severe floods, such as those classified as 100- or 500-year floods, can destroy homes, infrastructure, and farmland. In extreme cases like flash floods, lives may be lost, and recovery can take several years.

4.9.5 Secondary Hazards

Floods can lead to secondary hazards like landslides and soil instability. Intense flooding from flash events or infrastructure breaches can saturate soils, decrease their stability, and cause landslides on steep slopes. After wildfires, flooding can raise the risk of mudslides and debris flows because the removal of vegetation creates conditions that favor these hazards during heavy rains. Floodwater, especially with high force from dam breaches, can cause erosion by washing away topsoil and sediment from riverbanks and floodplains. Extended flooding that saturates soil can increase its weight and may lead to sudden ground collapse or subsidence.

4.9.6 Exposure and Vulnerability

4.9.6.1 Lifelines

Flooding can have major impacts on critical lifelines by damaging or disabling essential infrastructure, including roads, bridges, water supply and treatment facilities, power grids, and communication networks. Floodwater can make transportation routes impassable, disrupt electricity and water services, and hinder emergency response operations. Even temporary interruptions can create cascading effects, affecting other lifelines, delaying recovery efforts, and increasing risks to public safety and property.

The following sections provide a summary of the lifeline analysis for both FEMA-designated flood hazard areas and county-identified flood zones, with detailed local breakdowns included in the local government annexes.

4.9.6.1.1 100-Year Floodplain

4.9.6.1.1.1 Critical Facilities

A FEMA 100-year floodplain represents an area that could experience a flood of a certain magnitude, large enough to have a 1% chance of occurring in any given year, rather than a flood that happens only once every 100 years. The lifeline analysis found that Jefferson County does not have any critical facilities situated within the 100-year floodplain.

4.9.6.1.1.2 Lifeline Systems

The analysis of community lifeline systems identified 68.3 miles of infrastructure, 4.8% of the total system network, located within mapped 100-year floodplain areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 33.3 miles (4.3%)
- **Energy**
  - Electric Transmission Lines: 17.3 miles (6.9%)
  - Gas Transmission Lines: 2.0 miles (2.5%)
- **Transportation**
  - Major Roadways: 14.9 miles (5.9%)
  - Railway: 0.7 miles (1.3%)

4.9.6.1.2 500-Year Floodplain

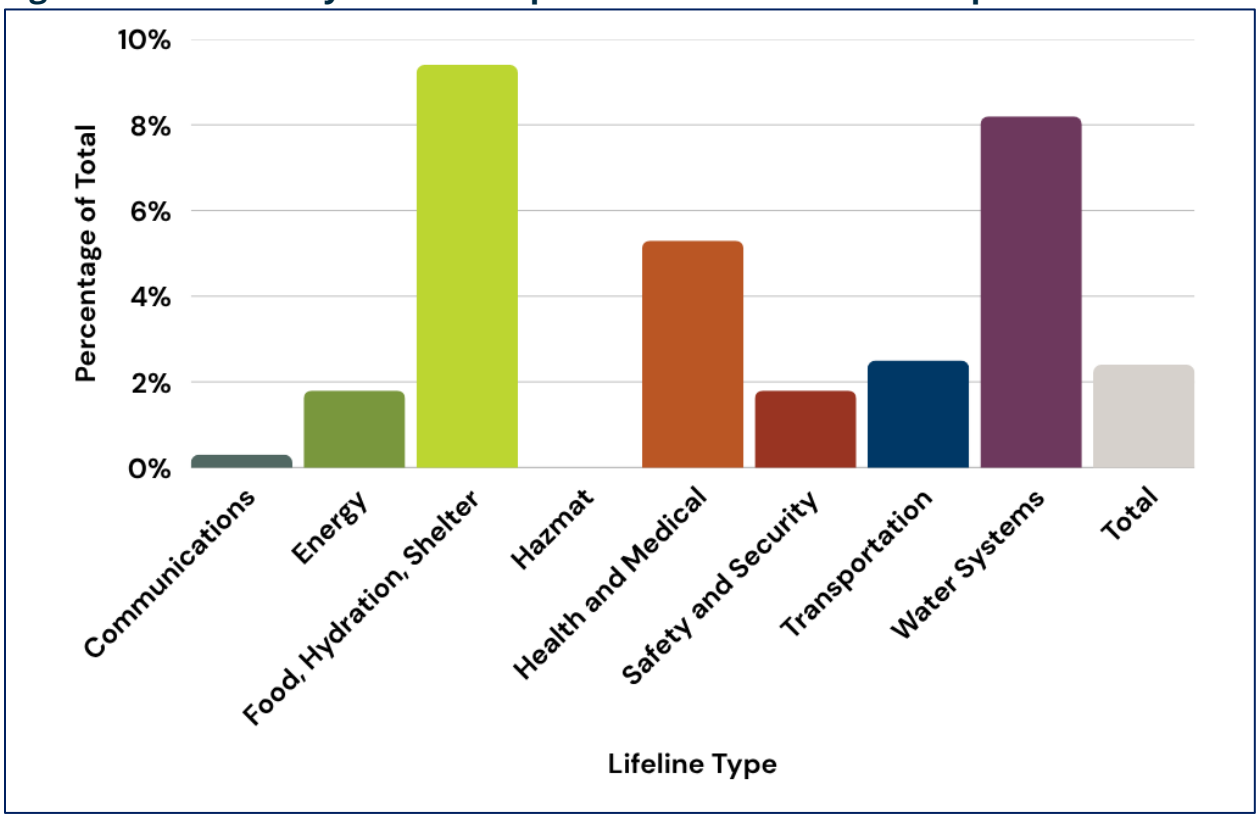
4.9.6.1.2.1 Critical Facilities

A FEMA 500-year floodplain represents an area that could experience a flood of a larger magnitude, with a 0.2% chance of occurring in any given year, rather than a flood that happens only once every 500 years. Key findings from the lifeline analysis of the 500-year floodplain highlight critical infrastructure vulnerabilities and concerns, summarized below and shown in **FIGURE 20**. In Jefferson County, safety and security assets account for the greatest total number of exposed lifelines to wind deposit areas, while food, hydration, and shelter lifelines represent the highest percentage of exposure by type.

- **Communications: 1 facility** (0.3% of total communication facilities)
- **Energy: 1 facility** (1.8% of total energy facilities)
- **Food, Hydration, Shelter: 3 facilities** (9.4% of total FHS facilities)

- **Hazardous Materials: 0 facilities** (0.0% of total hazardous materials facilities)
- **Health and Medical: 5 facilities** (5.3% of total health and medical facilities)
- **Safety and Security: 17 facilities** (1.8% of total safety and security facilities)
- **Transportation: 2 facilities** (2.5% of total transportation facilities)
- **Water Systems: 10 facilities** (8.2% of total water system facilities)
- **Total Community Lifelines: 39 facilities** (2.4% of total lifeline facilities)

Figure 20 Community Lifelines Exposed to the 500-Year Floodplain



4.9.6.1.2.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 28.0 miles of infrastructure, 2.0% of the total system network, located within mapped 500-year floodplain areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 16.0 miles (2.0%)
- **Energy**
  - Electric Transmission Lines: 4.1 miles (1.6%)
  - Gas Transmission Lines: 0.3 miles (0.4%)

- **Transportation**
  - Major Roadways: 7.0 miles (2.8%)
  - Railway: 0.6 miles (1.1%)

4.9.6.1.3 County Identified Flood Areas

4.9.6.1.3.1 Critical Facilities

In addition to FEMA-designated flood areas (100- and 500-year floodplains), Jefferson County has identified additional areas that are not federally recognized or studied. These areas, classified as County Flood-Prone Areas and Zoned Flood Areas, are considered by the county to be at potential risk of flooding. An analysis of critical facilities within these areas found only two structures at risk: one health and medical facility and one safety and security facility. Together, they account for just 0.1% of all critical facilities in the county, indicating minimal flood exposure. Additionally, no critical facilities are located within zone flood areas.

4.9.6.1.3.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 2.3 miles of infrastructure, 0.2% of the total system network, located within mapped county flood prone areas. This analysis also identified 1.5 miles of infrastructure, 0.1% of the total system network, located within county identified flood prone areas.

4.9.6.2 People

Flood hazards can have significant impacts on people, including injury, loss of life, and displacement from homes. Flooding can disrupt access to essential services such as healthcare, transportation, utilities, and emergency response, and can lead to economic hardship due to property damage or loss of income. These impacts can be especially severe for individuals with access and functional needs, including older adults, people with disabilities, those with limited mobility, people who rely on medical equipment or caregiver support, and individuals who face transportation or communication barriers, because evacuation, sheltering, and recovery may be more difficult. As a result, these populations are often at greatest risk during flooding events.

4.9.6.3 Structures

4.9.6.3.1 100-Year Floodplain

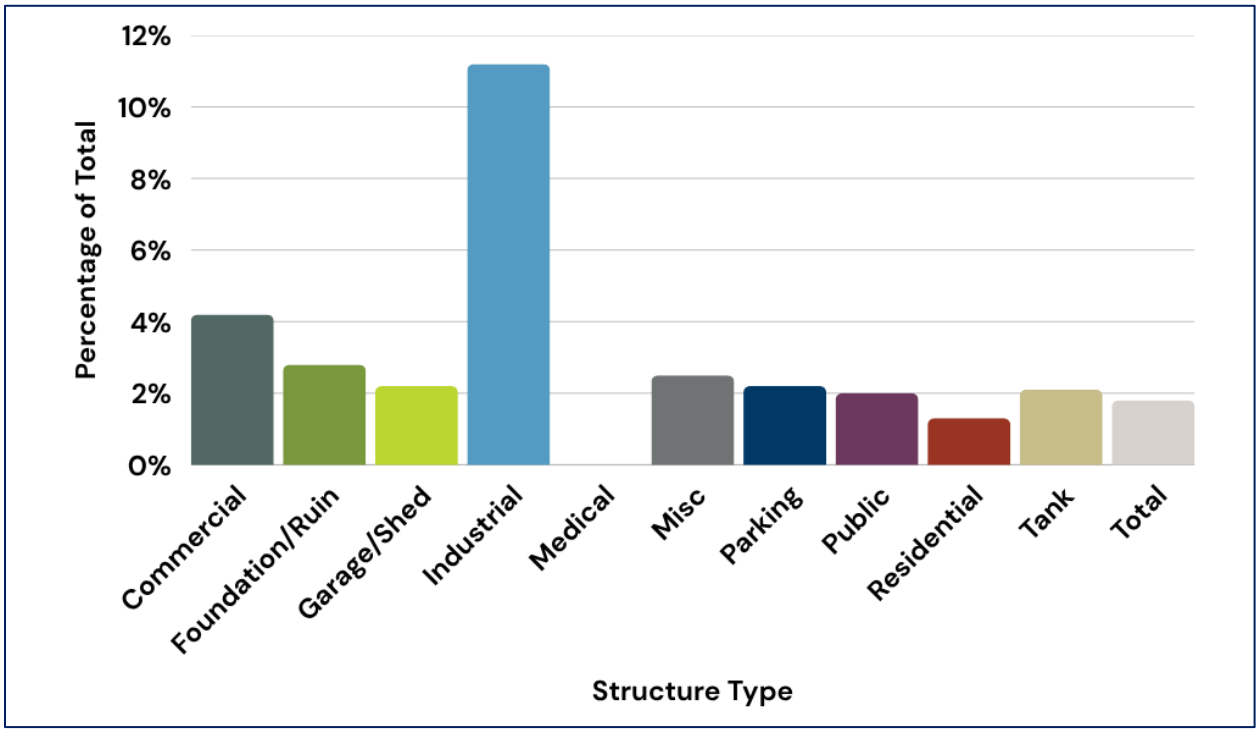
Flooding can damage structures by weakening foundations, causing walls and floors to crack, and saturating building materials, which can lead to mold, rot, and long-term structural issues. Even short-term flooding can disrupt building systems and require costly repairs. **TABLE 17** below summarizes the number and types of structures in the FEMA 100-Year Floodplain Area, while **FIGURE 21** illustrates the percentage distribution of structures by type. In Jefferson County, residential structures account for the greatest total number of buildings exposed to the 100-Year Floodplain, while industrial structures represent the highest percentage of exposure relative to their structure type.

Table 17 Structures in the 100-Year Floodplain

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	338	$359,075,011	$224,092,484
Foundation/Ruin	13	$6,277,440	$5,183,327
Garage/Shed	3,021	$412,578,239	$151,942,397
Industrial	126	$141,580,450	$110,938,461
Medical	0	$0	$0
Misc	150	$33,750,411	$3,465,056
Parking Structure	1	$0	$0
Public	37	$40,852,040	$19,588,030
Residential	2,305	$1,347,421,491	$834,882,973
Tank	18	$5,906,034	$128,120
Total	**6,009**	**$2,347,441,115**	**$1,350,220,847**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 21 Percent of Structures Exposed to the 100-Year Floodplain



4.9.6.3.2 500-Year Floodplain

The 500-year floodplain can have impacts similar to those in the 100-year floodplain, such as foundation damage, cracking, and water intrusion, but it represents a more severe storm event. Flooding in these areas is likely to be deeper, more extensive, and cause greater disruption to structures and building systems. **TABLE 18** summarizes the total structures by type in these floodplain areas, and **FIGURE 22** illustrates the percentage distribution of structure count by type. In Jefferson County, residential structures account for the greatest total number of buildings exposed to the 500-Year Floodplain, while industrial structures represent the highest percentage of exposure relative to their structure type.

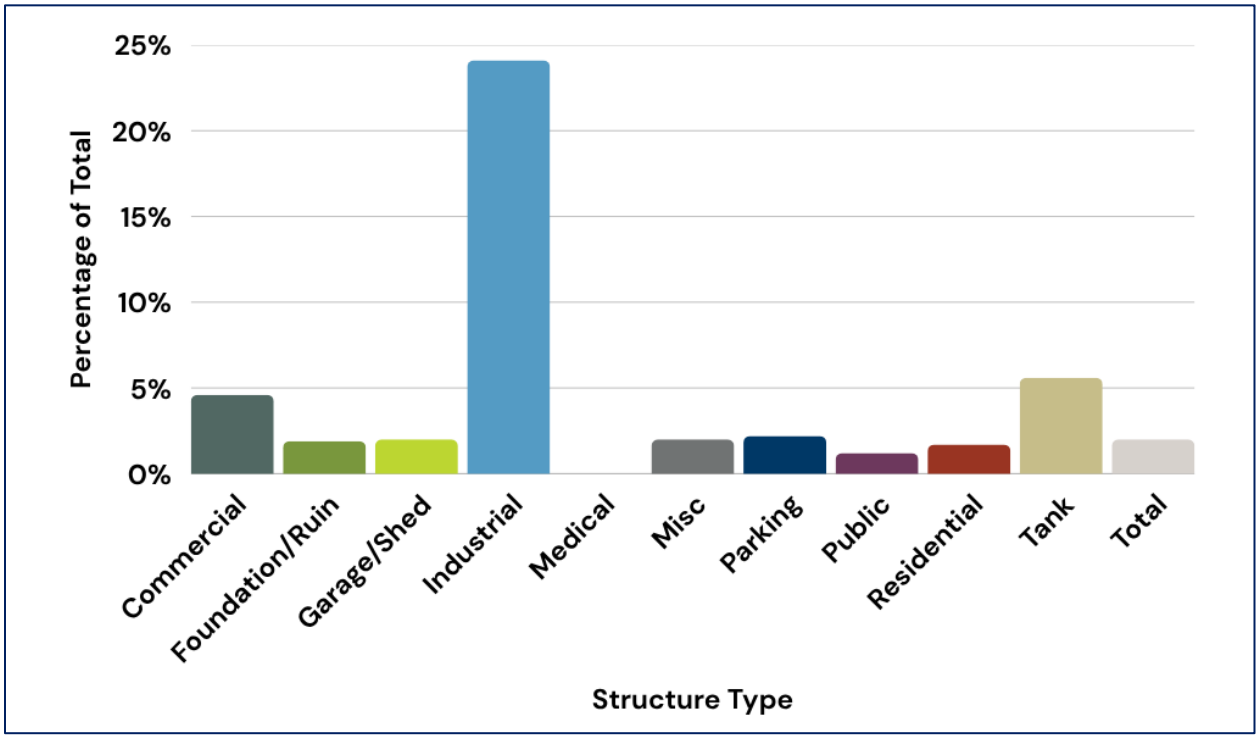
Table 18 Structures in the 500-Year Floodplain

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	365	$565,884,850	$394,849,157
Foundation/Ruin	9	$448,533,546	$442,941,394
Garage/Shed	2,687	$322,597,956	$193,600,769
Industrial	272	$420,160,322	$316,579,295

Structure Type	Structure Count	Structure Value	Improved Value
Medical	0	$0	$0
Misc	121	$8,956,489	$4,547,217
Parking Structure	1	$0	$0
Public	21	$22,181,399	$10,092,261
Residential	2,912	$1,557,316,437	$1,000,152,455
Tank	47	$2,235,961	$453,736
Total	**6,435**	**$3,347,866,960**	**$2,363,216,284**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 22 Percent of Structures in the 500-Year Floodplain



4.9.6.3.3 County Identified Flood Areas

Additionally, county-identified flood areas have been mapped in locations outside of the official FEMA floodplain boundaries. The structural analysis for county flood-prone and zoned flood areas identified 444 structures at risk, representing just 0.14% of all structures in Jefferson County. These structures have a combined total value of $143,712,040, with $67,138,603 attributed to improvements. Garages/sheds and residential buildings account for the highest numbers of

exposed structures. Overall, these flood-prone areas do not pose an extreme risk to the majority of structures in the county, given their relatively small impact on the total building inventory.

4.9.6.4 Natural, Historic, and Cultural Resources

Natural and cultural resources are vulnerable to flooding. These incidents can cause immediate and persistent damage to rivers, wetlands, forests, and wildlife habitats through processes like erosion, sediment buildup, and pollution. Such impacts disrupt ecosystems, harm biodiversity, and diminish water quality. Similarly, historic buildings, and landmarks are at risk of structural damage, water infiltration, and erosion, risking loss of heritage.

4.9.6.5 Local Vulnerability

Jefferson County is concerned about the accuracy of flood risk maps, which could lead to gaps in planning and emergency response. The county currently has funding to update these maps, improving their accuracy and enhancing communication of flood risks to homeowners. Additionally, there are concerns that some culverts do not provide adequate drainage, increasing the risk of localized flooding. Several projects are currently underway in the county to expand and improve culvert capacity.

4.9.7 Probability of Future Occurrences

Historical data from 1996 to 2023 show that 55 flood events were reported in the NOAA NCEI Database, indicating that it is highly likely that a severe flood occurs somewhere in Jefferson County every one to 10 years.

4.9.8 Climate Change Impacts

Climate change is increasing flood risk in Jefferson County by intensifying precipitation extremes and altering snowmelt patterns. According to the Jefferson County Climate Action Plan, warmer temperatures cause earlier snowmelt and more rain-on-snow events, leading to increased runoff and faster peak flows in creeks such as Ralston, Clear, and Bear. The CO E-SHMP also states that a warmer atmosphere can hold more moisture, resulting in heavier rainfall and flash floods, even in areas usually not prone to flooding.

These changes intensify the effects of drought and wildfire, as future dry, compacted soils and burn scars reduce water absorption, boosting surface runoff and debris flows. In Jefferson County, this leads to more frequent and severe floods

that threaten homes, transportation routes, and water infrastructure. As the climate warms further, the county faces greater challenges in stormwater management, maintaining natural flood buffers, and protecting vulnerable communities from flood damages.

4.10 Ground Instability Hazards (Erosion/Deposition, Expansive Soils/Heaving Bedrock, Ground Subsidence)

4.10.1 General Background

Soil instability happens when a soil's capacity to support structures or resist movement is weakened, risking damage to infrastructure and natural environments. It is associated with geological processes and hazards such as erosion, expansive soils, and ground subsidence.

Erosion happens when wind, water, or ice removes soil from one place and deposits it somewhere else. This can weaken the soil structure and undermine foundations and slopes, impacting nearby structures. Deposition occurs when eroded materials are placed in new locations. In areas with expansive soil, erosion can worsen when moisture fluctuations cause the soil to lose its cohesion.

Expansive soils are soils that experience significant volume changes with moisture content variations. These soils, such as clay, swell when wet and shrink when dry. This can cause uneven ground movement and stress on a structure's foundation over time due to the cycle of expansion and contraction.

Heaving bedrock refers to the upward displacement of solid rock layers beneath the ground, often caused by swelling minerals within the rock as they absorb moisture. This is most common in shale or clay-rich bedrock that expands with changes in groundwater or precipitation. Such movement can lead to uneven ground surfaces, foundation cracks, and infrastructure damage, creating notable challenges for construction and land stability in affected regions.

Ground subsidence refers to the settling or sinking of the earth's surface. This can be caused by the collapse of underground voids, the removal of water from underground aquifers, or the compaction of soil due to excessive weight. Additionally, erosion of riverbanks or other water bodies can destabilize the ground, leading to localized ground subsidence.

For more general background information on ground instability hazards in Colorado, refer to the **2023 COLORADO E-SHMP**.

4.10.2 Past Events

4.10.2.1Erosion

Erosion is common in Jefferson County but becomes problematic when excessive sediment enters water supplies due to human activities or after wildfires, affecting watershed health. Development erosion from unprotected sites is widespread but hard to measure; regulations aim to reduce it.

Following the 1996 Buffalo Creek Fire, which burned within the Pike National Forest in the South Platte Watershed and foothills of Jefferson County, flooding and sediment buildup severely degraded water quality at Strontia Springs Reservoir three months after the fire. The reservoir also experienced significant degradation in water quality due to the input of burned material and sediment. Denver Water, the agency responsible for distributing drinking water from the reservoir, estimates cleanup costs of over $1 million and dredging expenses of $23 million.

The 2002 wildfire season caused long-lasting erosion risks, prompting restoration efforts in 2009, seven years after the Hayman Fire, to undo damage caused by the wildfire. Following the lessons learned from the Buffalo Creek Fire, Denver Water installed sediment traps on Turkey Creek to protect Cheesman Reservoir for $2 million, with ongoing maintenance.

In 2013, heavy rainfall caused channel migration, erosion, and flooding along Coal Creek, damaging numerous properties and failing culverts, with extensive cleanup and repairs by local agencies. Highway 72 was fully reopened after two months of detours. Flood repairs included debris removal, road reconstruction, bank reinforcement, and shoulder addition, completed in 2020.

4.10.2.2 Expansive Soils/Heaving (Dipping Bedrock)

According to the State Hazard Mitigation Plan, Jefferson County reported in 1995 that heaving bedrock alone caused tens of millions of dollars in extra maintenance costs for county taxpayers. Growth in areas such as western Arvada, Lakewood, and new developments east of Highway 93 and north of Golden have increased exposure to these geologic hazards. Although development in Pike National Forest is limited, ongoing monitoring indicates that over 75% of the area is at risk of soil

swelling or bedrock dipping. These conditions impact roughly half of the county's planning area.

4.10.2.3 Ground Subsidence

The following events are noted in the CO E-SHMP as taking place in Jefferson County.

The Colorado School of Mines family housing in Golden was built over a reclaimed open-pit clay mine. In the 1970s, some units were condemned and remediated, although differential settlement and structural cracking have continued to be observed. In recent years, the school has made the subsidence-prone area into an athletic field; however, ongoing subsidence-related issues are still being reported. Sidewalks, streets, and two-story buildings have sustained substantial damage from settlement. In 2004, during the construction of an athletic field in a subsidence-prone area, depressions began forming. In the spring of 2005, the area reactivated from the snowmelt runoff. Several open holes in the field were visible, and the street near the sorority houses was damaged. The structures themselves were not, as they sit on deep piers on the sandstone that was not mined. A grouting program was implemented to try to stabilize the area in 2005; however, in 2006, additional street damage occurred, and several new depressions were found in the field. In 2008, the Colorado Division of Reclamation, Mining, and Safety conducted a geophysical survey to identify areas where voids still existed, enabling the development of a mitigation strategy to avoid future damage.

In 1988, a sinkhole opened up overnight in an open space area next to Deer Creek Middle School. The next day a student fell into the sinkhole but his injuries were minor. The sinkhole suddenly formed when the roof over a void left by a past coal mine collapsed. A sinkhole also suddenly formed in an Albertson's parking lot nearby. No one was injured, but some cars were damaged.

In 1995, just north of Deer Creek Middle School, the county proposed extending a major road near the same coal mine (Economy Mine). Old mine maps did not show that the proposed extension would be located over undermined areas. Since old mine maps are often inaccurate, Jefferson County decided to drill in the proposed construction area. The first boring found evidence of mining and confirmed that the risk of sinkholes extended under the road extension. The county spent an additional $500 thousand on 300 linear feet of roadway to mitigate this sinkhole risk.

The county has 48 abandoned coal mines and about 100 inactive mines mapped. Small, periodic subsidence events are particularly noted in rural foothill areas.

4.10.3 Location

There is currently no comprehensive dataset tracking the specific locations of erosion in Jefferson County, making it difficult to identify precise erosion sites. However, erosion typically occurs in areas with steep slopes, loose soils, and sparse vegetation. This includes regions of the county affected by wildfires, where vegetation loss can increase the likelihood of erosion. Riparian zones along rivers and streams, such as the Clear Creek, are also susceptible to erosion due to water flow dynamics as was seen in the September 2013 Floods.

Spatial data illustrating the distribution of highly expansive soils across Jefferson County is shown in **FIGURE 23**. Expansive soils are prevalent across the urban incorporated municipalities in the northwestern portion of the county.

The areas at risk of ground subsidence in Jefferson County are shown in **FIGURE 24**. Areas of ground subsidence are in the incorporated areas in the western portion of the county, including west of Arvada and Golden, as well as smaller areas south of Lakewood. Collapsible soil is prevalent on the west side of town across the incorporated municipalities, as illustrated in **FIGURE 25**.

FIGURE 27 shows the location of wind blow deposits in the county. Wind deposits form through the processes of erosion and deposition, in which strong winds erode and transport fine-grained sediments from one location to another.

Figure 23 Expansive Soils Areas in Jefferson County

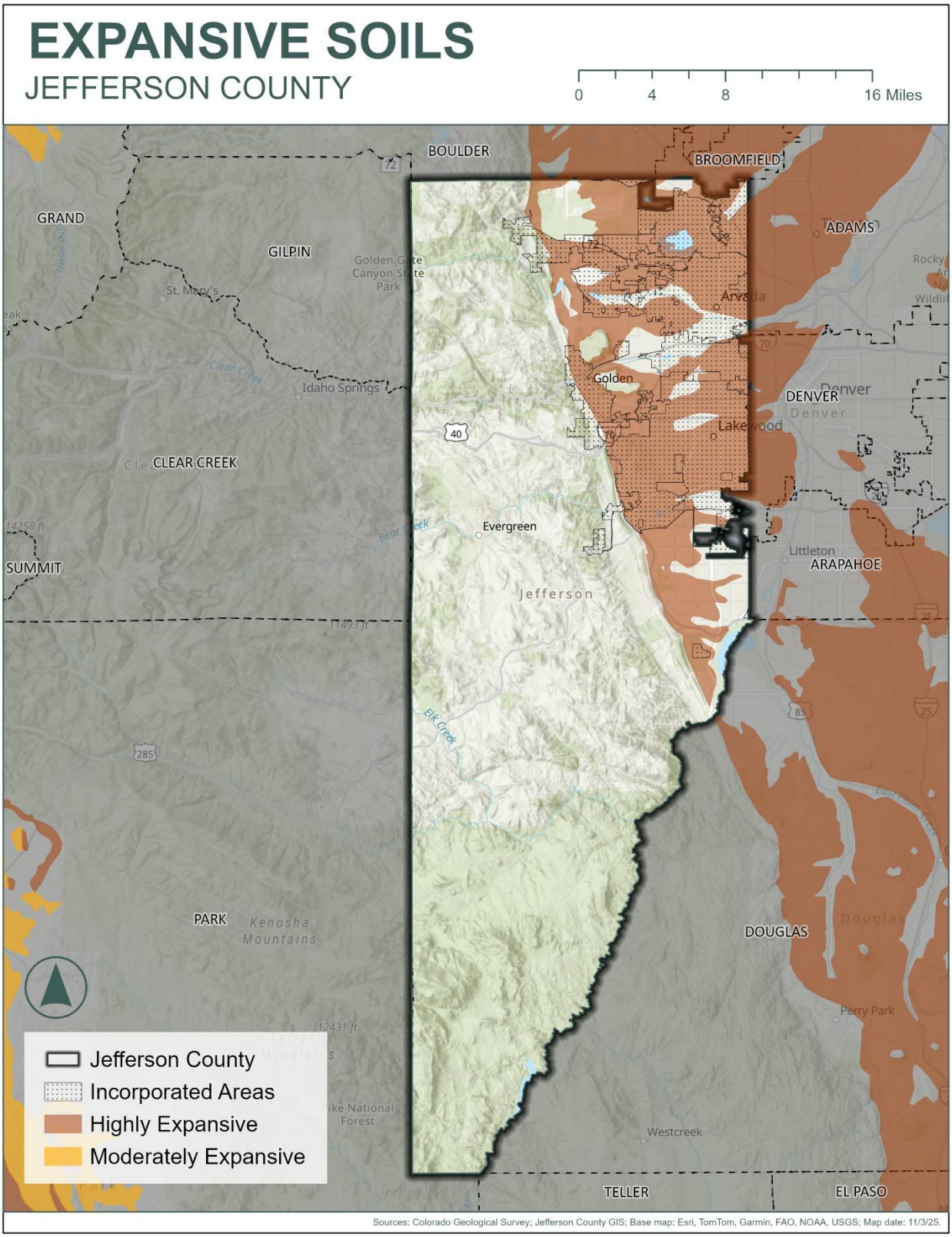


Figure 24 Ground Subsidence Areas in Jefferson County

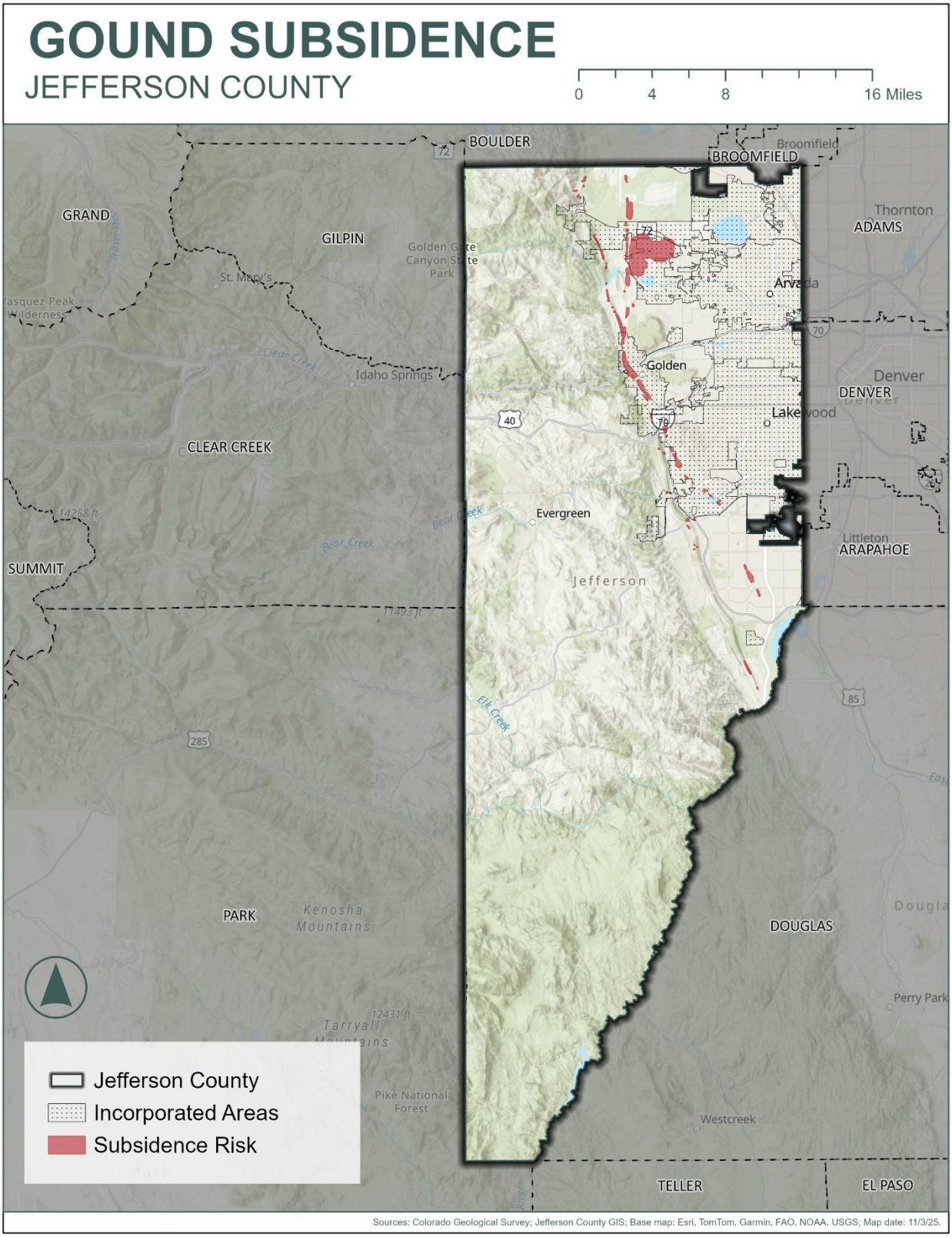


Figure 25 Areas of Collapsible Soils in Jefferson County

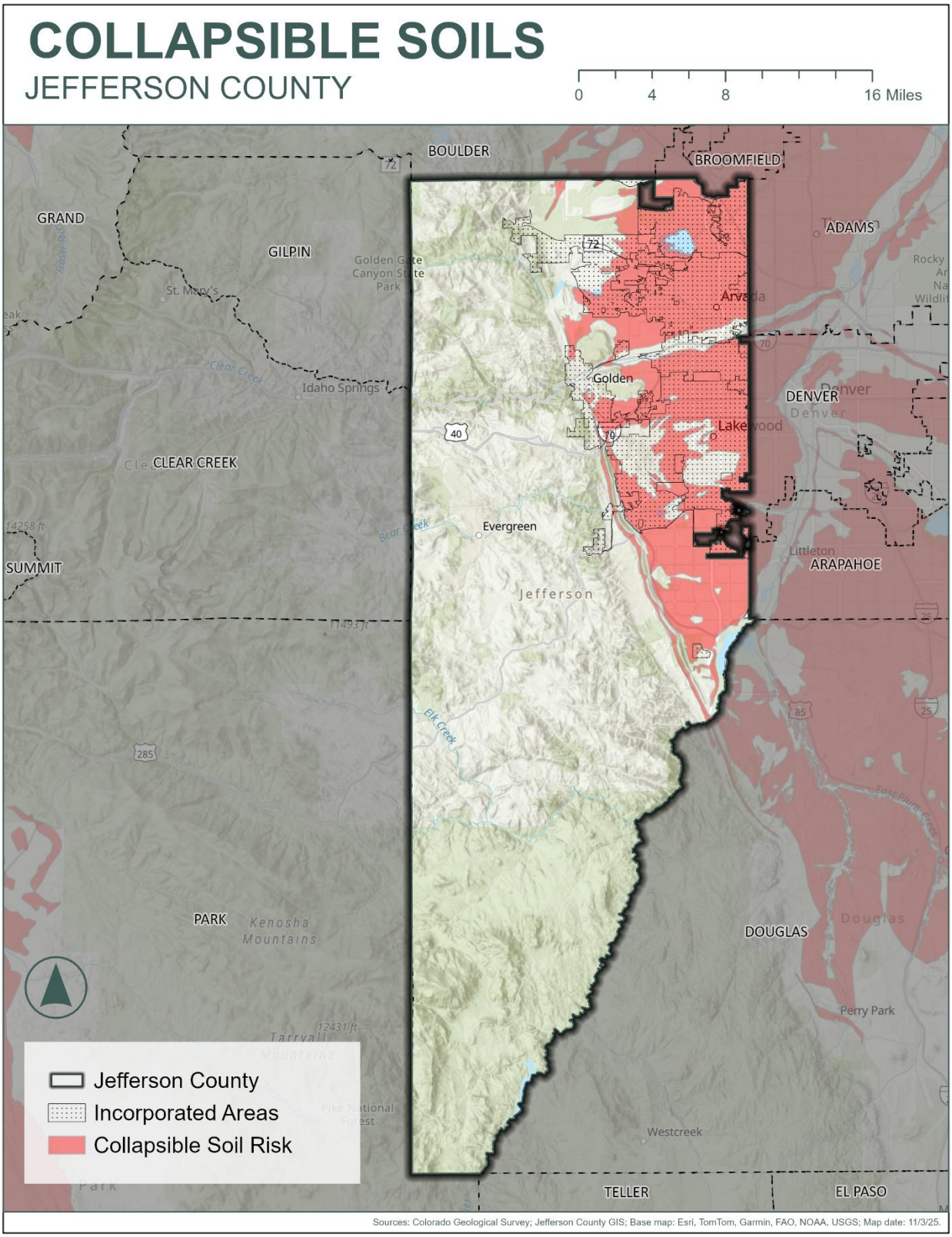
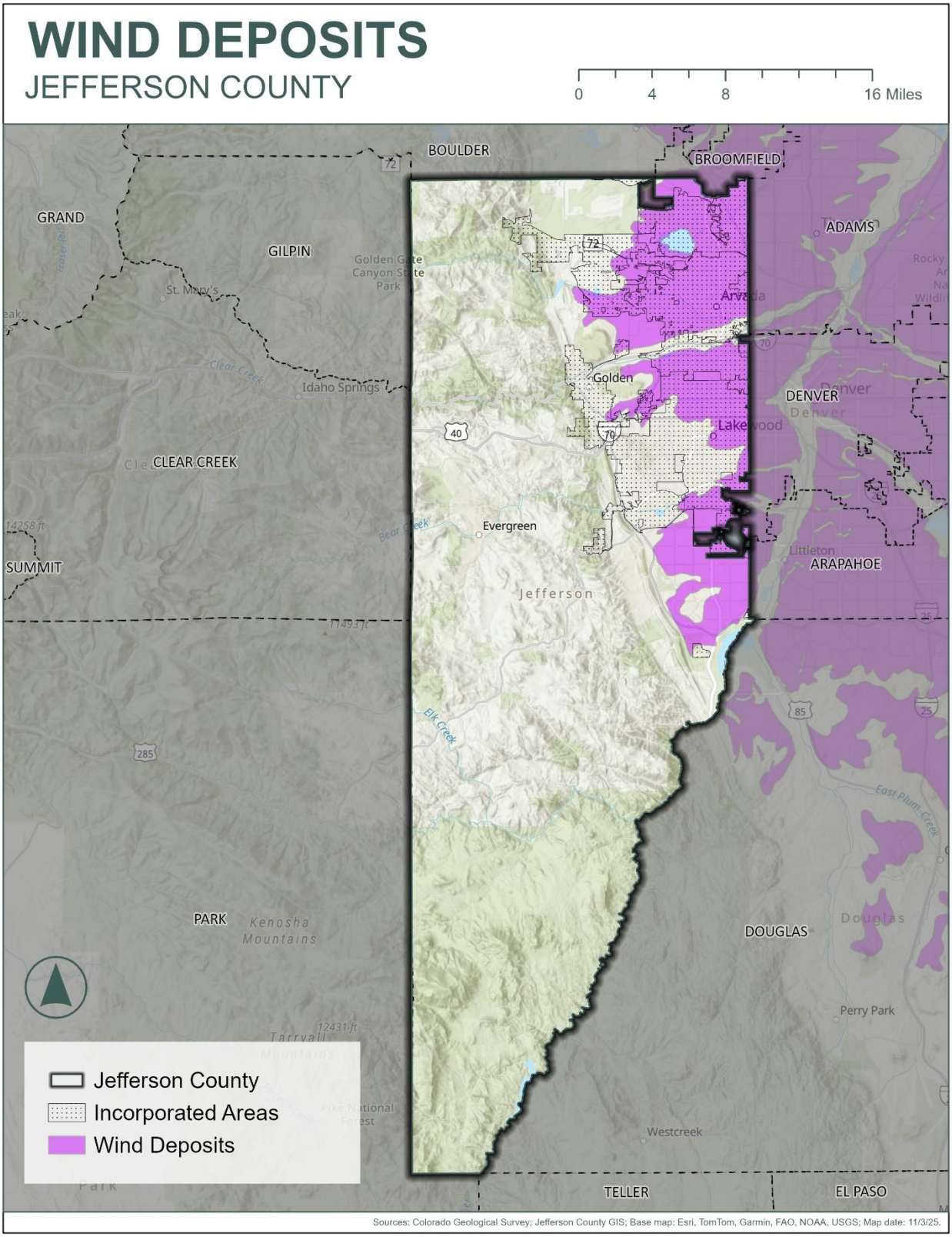


Figure 26 Wind Blown Deposits in Jefferson County



4.10.4 Severity

Soil instability presents major risks to both natural environments and human-built structures. The level of danger varies based on environmental factors and the existence of vulnerable structures above the soil. Erosion gradually degrades soil and land quality, harming natural ecosystems and reducing agricultural output. Soil-related hazards can compromise the foundations of buildings, roads, and bridges. In severe cases, expansive soils may cause structural failure, leading to costly repairs. Ground subsidence can produce large sinkholes that engulf entire buildings, roads, and utilities. Such events can significantly damage infrastructure, disrupt utility services, and increase the risk of injury to people.

The event of record for ground instability hazards is the resulting erosion caused by the Buffalo Creek Fire in 1996, which has had long-term impacts. Response and recovery costs to address erosion problems have cost Denver Water alone over $23 million ($47.4 million in 2025).

4.10.5 Secondary Hazards

Soil instability can cause secondary hazards such as flooding and landslides. Erosion can disrupt streams and rivers, leading to flooding. The removal of topsoil and vegetation can increase water flow. Due to frequent soil expansion and contraction, expansive soils may cause landslides, especially on slopes. Ground subsidence on steep slopes can lead to unstable soil and rocks, also resulting in landslides.

4.10.6 Exposure and Vulnerability

4.10.6.1 Lifelines

A summary of the lifeline analysis for soil-instability hazards is provided in the following sections, with detailed local breakdowns in the local government annexes.

4.10.6.1.1 Erosion/Deposition

4.10.6.1.1.1 Critical Facilities

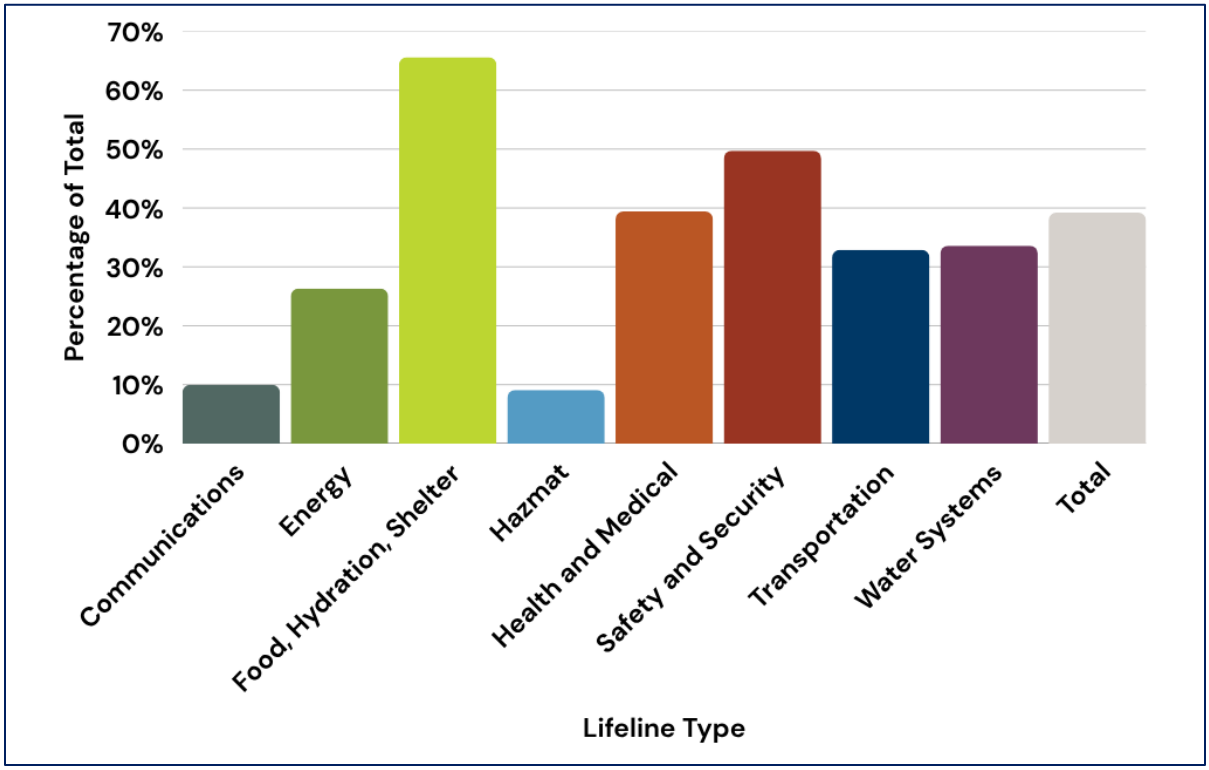
Wind deposits are formed through the processes of erosion and deposition, where strong winds erode and transport fine-grained sediments from one location and deposit them in another. These deposits can bury or obstruct lifelines like roads, railways, and utility corridors, reducing accessibility and disrupting emergency response. They can also overload structures (e.g., power lines, pipelines, and

communication equipment), leading to accelerated wear, outages, or costly maintenance.

Key findings from the lifeline analysis of wind deposit areas highlight critical infrastructure vulnerabilities and concerns, summarized below and shown in **FIGURE 27**. In Jefferson County, safety and security assets account for the greatest total number of exposed lifelines to wind deposit areas, while food, hydration, and shelter lifelines represent the highest percentage of exposure by type.

- **Communications: 29 facilities** (10.0% of total communication facilities)
- **Energy: 15 facilities** (26.3% of total energy facilities)
- **Food, Hydration, Shelter: 21 facilities** (65.6% of total FHS facilities)
- **Hazardous Materials: 1 facility** (9.1% of total hazardous materials facilities)
- **Health and Medical: 37 facilities** (39.4% of total health and medical facilities)
- **Safety and Security: 468 facilities** (49.7% of total safety and security facilities)
- **Transportation: 26 facilities** (32.9% of total transportation facilities)
- **Water Systems: 41 facilities** (33.6% of total water system facilities)
- **Total Community Lifelines: 638 facilities** (39.2% of total lifeline facilities)

Figure 27 Percent of Community Lifelines Exposed to Wind Deposits



4.10.6.1.1.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 548.5 miles of infrastructure, 38.6% of the total system network, located within mapped wind deposit areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 357.0 miles (45.6%)
- **Energy**
  - Electric Transmission Lines: 79.9 miles (31.8%)
  - Gas Transmission Lines: 21.8 miles (26.5%)
- **Transportation**
  - Major Roadways: 68.4 miles (27.1%)
  - Railway: 21.5 miles (41.2%)

4.10.6.1.2 Expansive Soils

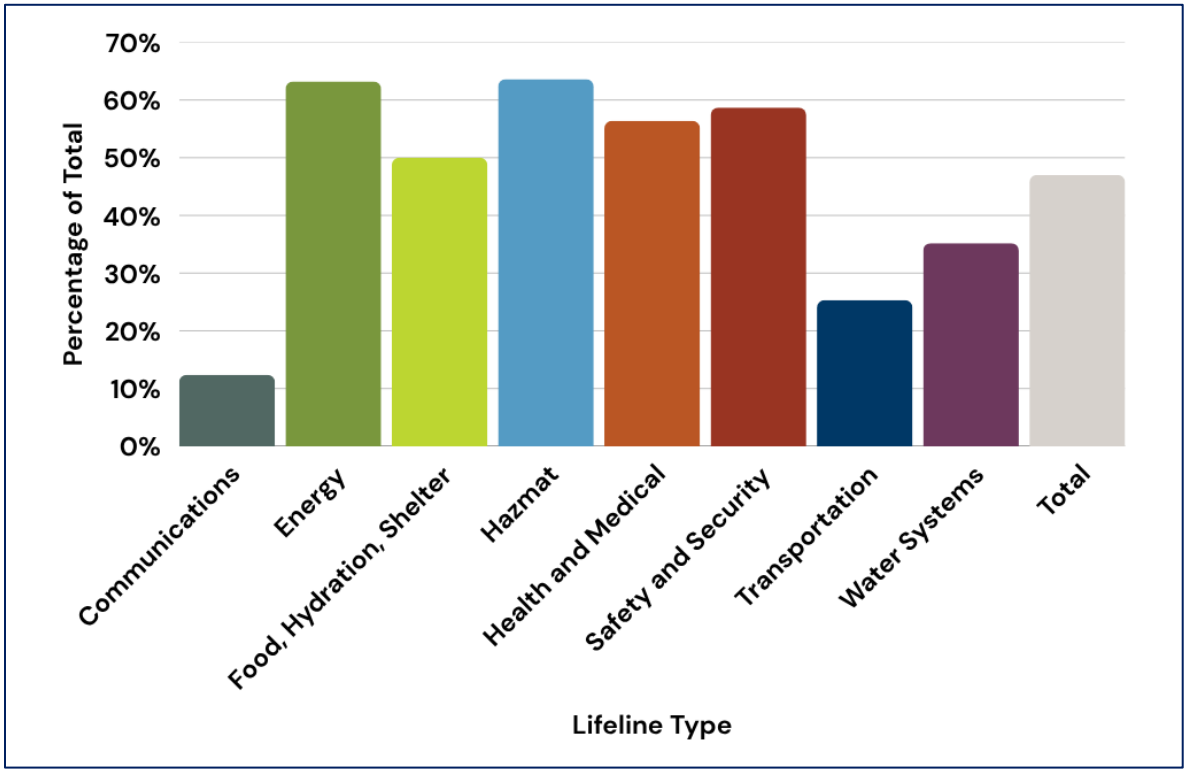
4.10.6.1.2.1 Critical Facilities

Expansive soil can lead to foundation cracking, uneven settling, and distortion of floors, walls, and utility connections, potentially compromising the integrity and

operation of essential infrastructure like hospitals, power plants, and water treatment facilities. The summary of the critical facilities analysis for highly expansive soil areas is presented below and depicted in **FIGURE 28**. In Jefferson County, safety and security assets comprise the largest total number of lifelines exposed to highly expansive soils, whereas hazmat and energy lifelines exhibit the highest proportion of exposure by type.

- **Communications: 36 facilities** (12.4% of total communication facilities)
- **Energy: 36 facilities** (63.2% of total energy facilities)
- **Food, Hydration, Shelter: 16 facilities** (50.0% of total FHS facilities)
- **Hazardous Materials: 7 facilities** (63.6% of total hazardous materials facilities)
- **Health and Medical: 53 facilities** (56.4% of total health and medical facilities)
- **Safety and Security: 553 facilities** (58.7% of total safety and security facilities)
- **Transportation: 20 facilities** (25.3% of total transportation facilities)
- **Water Systems: 43 facilities** (35.2% of total water system facilities)
- **Total Community Lifelines: 764 facilities** (47.0% of total lifeline facilities)

Figure 28 Percent of Community Lifelines Exposed to Highly Expansive Soils



4.10.6.1.2.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 843.1 miles of infrastructure, 59.3% of the total system network, located within mapped highly expansive soil areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Option Cables: 357.0 miles (45.6%)
- **Energy**
  - Electric Transmission Lines: 79.9 miles (31.8%)
  - Gas Transmission Lines: 21.8 miles (26.5%)
- **Transportation**
  - Major Roadways: 105.6 miles (41.9%)
  - Railway: 30.9 miles (59.2%)

4.10.6.1.3 Ground Subsidence

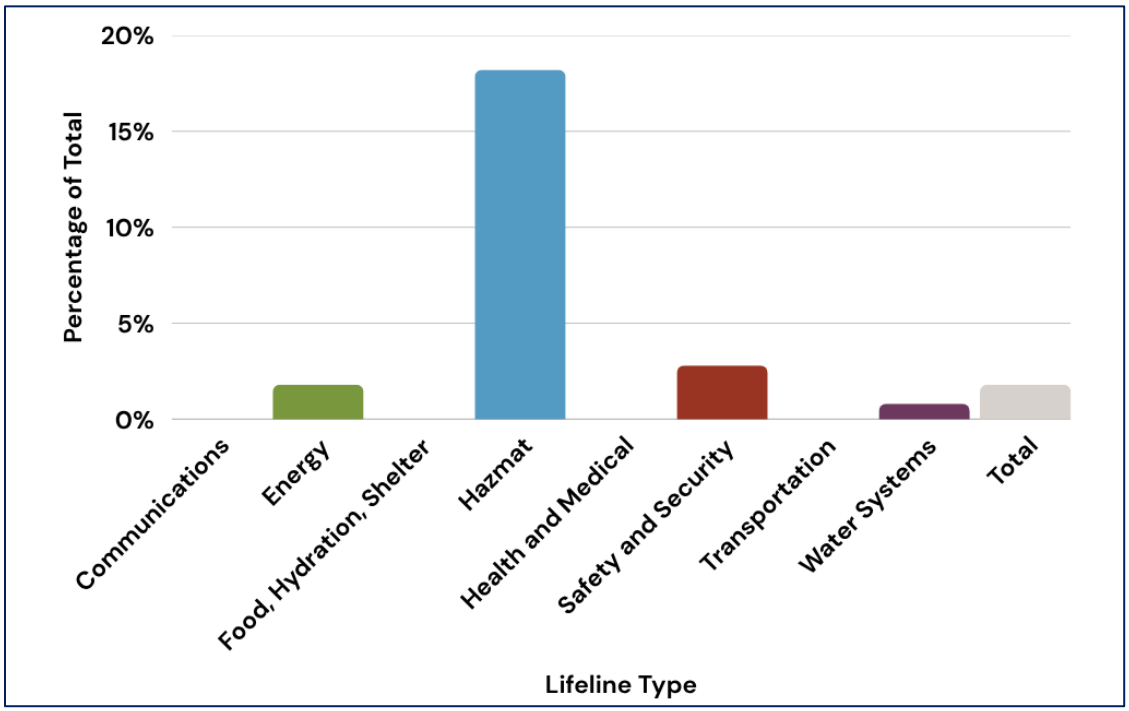
4.10.6.1.3.1 Critical Facilities

Ground subsidence can impact critical infrastructure by causing uneven settling, cracks, or collapses in structures and systems. Roads, bridges, pipelines, and rail

lines can become unsafe or unusable, while buildings, including hospitals, power plants, and water treatment facilities, may sustain structural damage. Utilities such as water, sewer, gas, and electricity lines can rupture, leading to service interruptions and increased risk of accidents. Key findings from the lifeline analysis of ground subsidence areas highlight critical infrastructure vulnerabilities and concerns, summarized below and shown in **FIGURE 29**. In Jefferson County, safety and security assets comprise the largest total number of lifelines exposed to ground subsidence risk areas, whereas hazmat lifelines exhibit the highest proportion of exposure by type.

- **Communications: 0 facilities** (0.0% of total communication facilities
- **Energy: 1 facility** (1.8% of total energy facilities)
- **Food, Hydration, Shelter: 0 facilities** (0.0% of total FHS facilities)
- **Hazardous Materials: 2 facilities** (18.2% of total hazardous materials facilities)
- **Health and Medical: 0 facilities** (0.0% of total health and medical facilities)
- **Safety and Security: 26 facilities** (2.8% of total safety and security facilities)
- **Transportation: 0 facilities** (0.0% of total transportation facilities)
- **Water Systems: 1 facility** (0.8% of total water system facilities)
- **Total Community Lifelines: 30 facilities** (1.8% of total lifeline facilities)

Figure 29 Percent of Community Lifelines Exposed to Ground Subsidence Areas



4.10.6.1.3.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 17.6 miles of infrastructure, 1.2% of the total system network, located within mapped ground subsidence areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 3.4 miles (0.4%)
- **Energy**
  - Electric Transmission Lines: 8.1 miles (3.2%)
  - Gas Transmission Lines: 1.9 miles (2.3%)
- **Transportation**
  - Major Roadways: 3.0 miles (1.2%)
  - Railway: 1.2 miles (2.3%)

4.10.6.1.4 Collapsible Soils

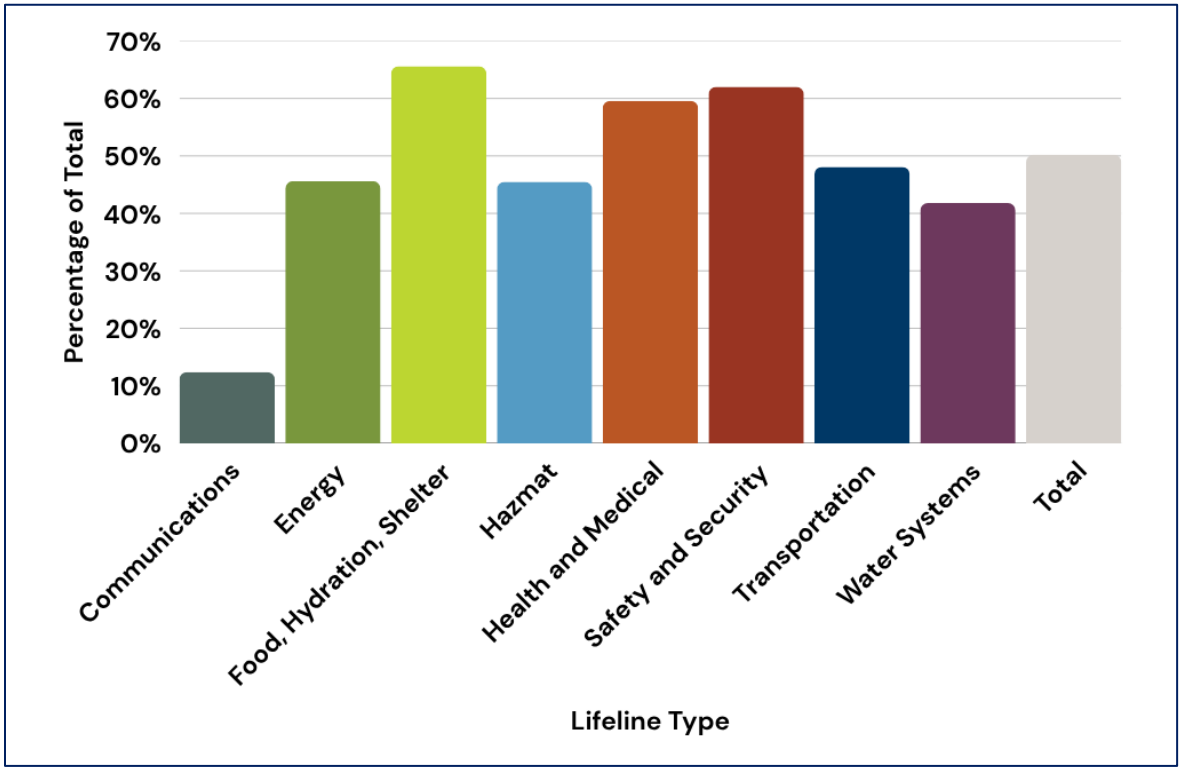
4.10.6.1.4.1 Critical Facilities

Collapsible soils are loosely packed, often dry, fine-grained soils that can suddenly compact and shrink when they become saturated with water. Areas underlain by these soils are particularly susceptible to ground subsidence, as the sudden loss of

soil volume can cause the ground to sink unevenly. Key findings from the lifeline analysis of collapsible soil areas highlight critical infrastructure vulnerabilities and concerns, summarized below and shown in **FIGURE 30**. In Jefferson County, safety and security assets comprise the largest total number of lifelines exposed to collapsible soil areas, whereas the food, hydration, and shelter lifeline exhibits the highest proportion of exposure by type.

- **Communications: 36 facilities** (12.4% of total communication facilities)
- **Energy: 26 facilities** (45.6% of total energy facilities)
- **Food, Hydration, Shelter: 21 facilities** (65.6% of total FHS facilities)
- **Hazardous Materials: 5 facilities** (45.5% of total hazardous materials facilities)
- **Health and Medical: 56 facilities** (59.6% of total health and medical facilities)
- **Safety and Security: 584 facilities** (62.0% of total safety and security facilities)
- **Transportation: 38 facilities** (48.1% of total transportation facilities)
- **Water Systems: 51 facilities** (41.8% of total water system facilities)
- **Total Community Lifelines: 817 facilities** (50.2% of total lifeline facilities)

Figure 30 Community Lifelines Exposed to Collapsible Soils



4.10.6.1.4.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 807.3 miles of infrastructure, 56.8% of the total system network, located within mapped collapsible soil areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 522.0 miles (66.6%)
- **Energy**
  - Electric Transmission Lines: 127.5 miles (50.7%)
  - Gas Transmission Lines: 29.4 miles (35.8%)
- **Transportation**
  - Major Roadways: 252.0 miles (100%)
  - Railway: 52.3 miles (100%)

4.10.6.2 People

Soil instability hazards can directly and indirectly affect people, threatening their safety, property, and quality of life. In severe instances, they can lead to sinkholes, falling debris, or building collapses that may cause injuries or fatalities. Erosion can

also result in water contamination as sediment or debris enters waterways. These impacts can be especially serious for individuals with access and functional needs, because damage to homes, roads, and utilities can make evacuation, access to services, and recovery more difficult. More commonly, soil instability hazards create costly damage to infrastructure and buildings, and when roads or bridges are affected, essential services may be disrupted, and some areas may become inaccessible or unsafe to use.

4.10.6.3 Structures

4.10.6.3.1 Erosion/Deposition

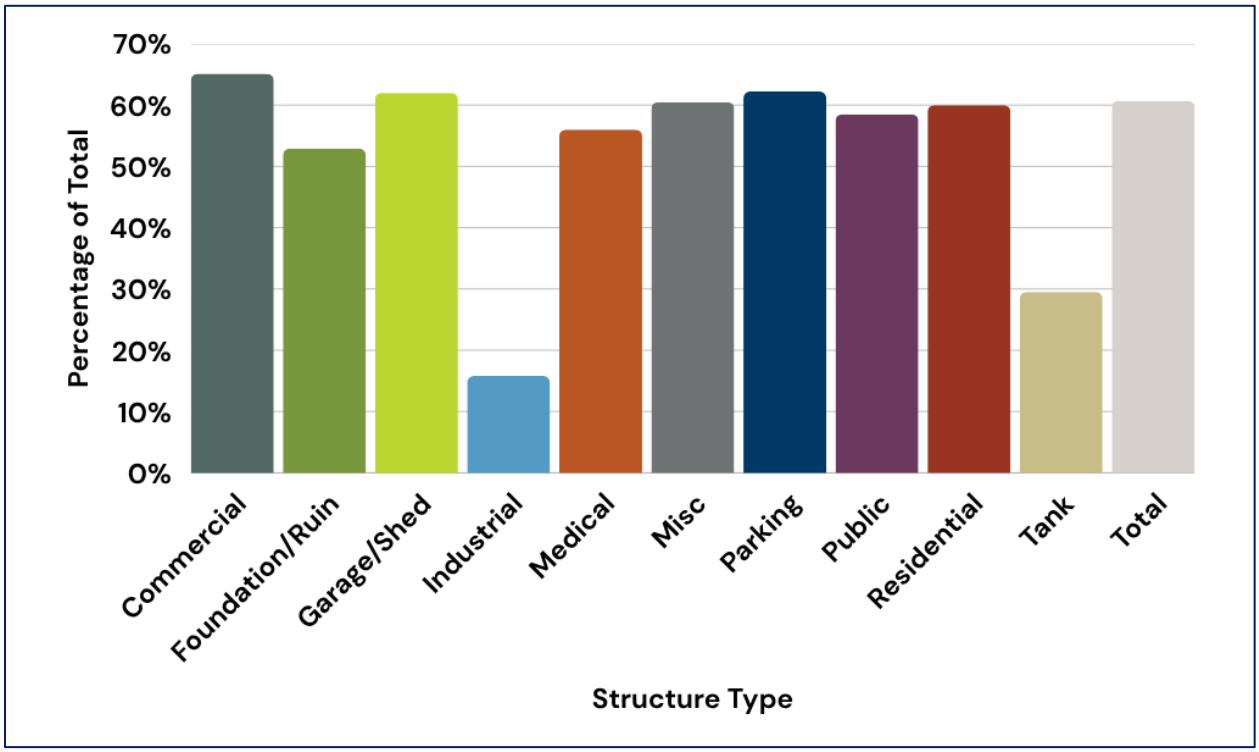
Wind can erode soil around a building, removing support from foundations and leaving them more likely to crack or shift. It can also deposit sand and dust against walls and around entrances, slowly wearing surfaces down and creating extra stress on the building over time. **TABLE 19** below summarizes the number and types of structures evaluated across the county exposed to wind deposit areas, while **FIGURE 31** illustrates the percentage distribution of structures by type. In Jefferson County, residential structures account for the greatest total number of buildings exposed, while commercial structures represent the highest percentage of exposure relative to their structure type.

Table 19 Structures Exposed to Wind Deposition

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	5,214	$9,478,730,272	$6,535,247,480
Foundation/Ruin	247	$808,067,788	$750,593,932
Garage/Shed	84,474	$6,831,832,903	$4,217,867,715
Industrial	178	$363,221,558	$281,933,694
Medical	51	$41,634,966	$36,308,092
Misc	3,672	$308,345,356	$188,129,353
Parking Structure	28	$284,813,134	$259,933,459
Public	1,064	$1,142,883,972	$860,266,620
Residential	104,285	$63,138,193,616	$42,397,212,750
Tank	249	$37,890,037	$17,084,347
Total	**199,462**	**$82,435,613,603**	**$55,544,577,443**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 31 Percent of Structures Exposed to Wind Deposits



4.10.6.3.2 Expansive Soils

Expansive soils absorb water and swell, then shrink as they dry out. This constant movement can lift, settle, or crack regular building foundations, leading to sticking doors, uneven floors, and minor to moderate structural damage over time. **TABLE 20** summarizes the total exposed structures by type to highly expansive soil areas, and **FIGURE 32** illustrates the percentage distribution of structure count by type. In Jefferson County, residential structures account for the greatest total number of buildings located in highly expansive soil areas, while parking structures represent the highest percentage of exposure relative to their structure type.

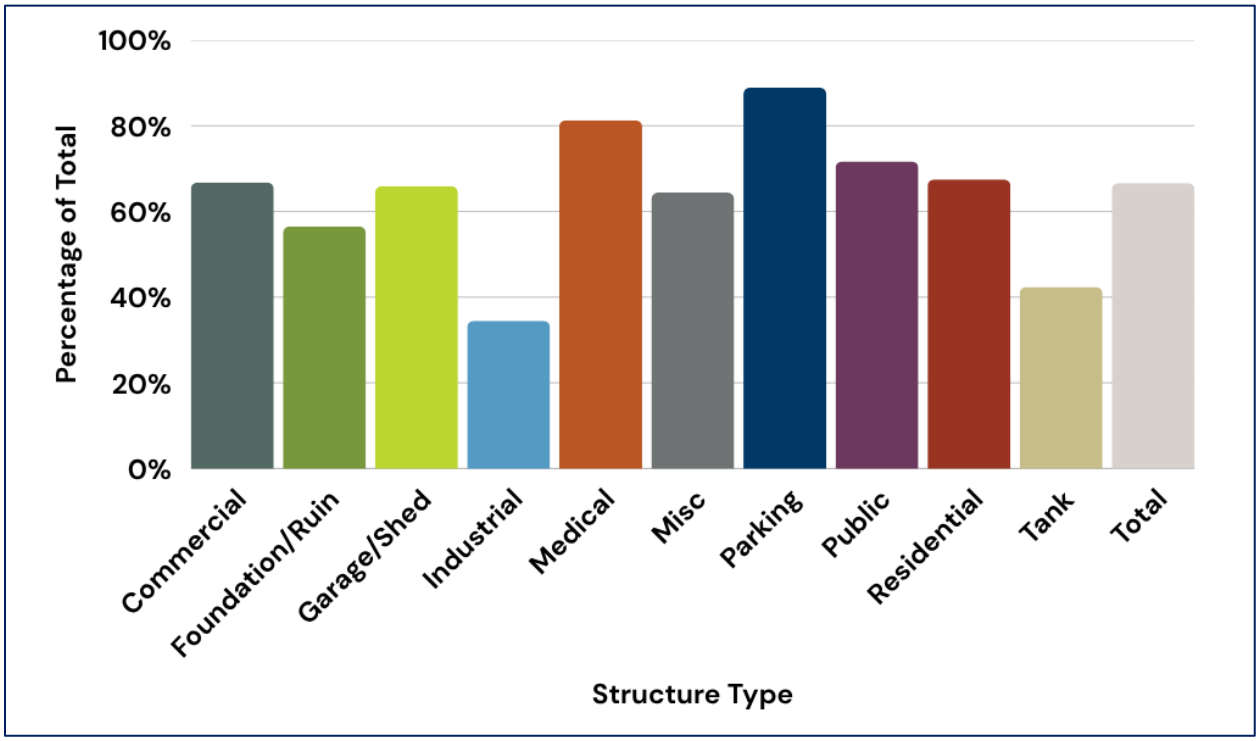
Table 20 Structures Exposed to Highly Expansive Soils

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	5,350	$9,652,134,434	$6,599,688,992
Foundation/Ruin	264	$357,223,763	$293,907,316
Garage/Shed	89,792	$7,350,070,191	$4,307,833,087
Industrial	390	$522,912,360	$391,837,355
Medical	74	$282,046,366	$275,987,095

Structure Type	Structure Count	Structure Value	Improved Value
Misc	3,910	$345,362,893	$197,729,881
Parking Structure	40	$377,300,110	$341,465,917
Public	1,305	$2,024,716,455	$1,593,235,861
Residential	117,268	$72,457,120,020	$47,982,527,144
Tank	358	$35,598,882	$9,595,852
Total	**218,751**	**$93,404,485,477**	**$61,993,808,500**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 32 Percent of Structures Exposed to Expansive Soils



4.10.6.3.3 Ground Subsidence

Ground subsidence causes the ground to sink, which can make buildings tilt, crack, or settle unevenly. This can damage foundations, walls, and floors, and may lead to costly repairs if the sinking is significant. **TABLE 21** summarizes the total structures by type exposed to ground subsidence areas, and **FIGURE 33** illustrates the percentage distribution of structure count by type. In Jefferson County, residential structures account for the greatest total number of buildings exposed to ground

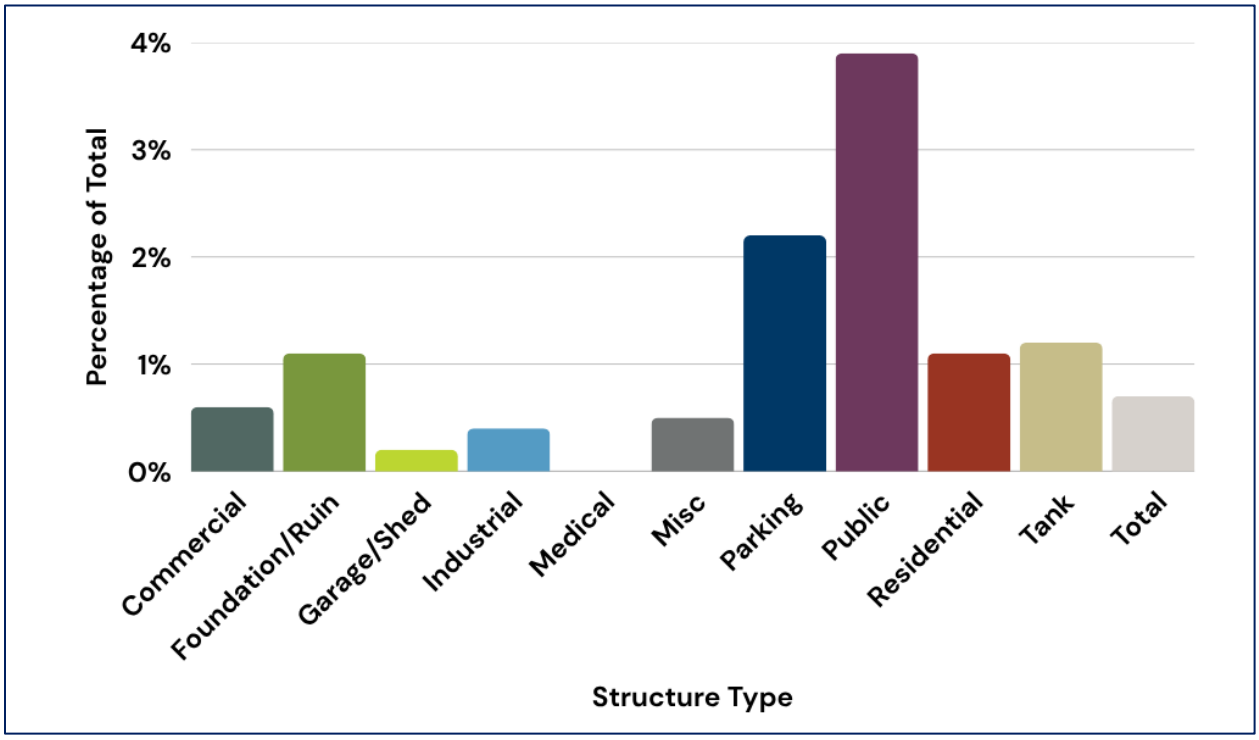
subsidence, while public structures represent the highest percentage of exposure relative to their structure type.

Table 21 Structures Exposed to Ground Subsidence

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	50	$106,285,006	$81,469,856
Foundation/Ruin	5	$4,866,596	$2,073,809
Garage/Shed	321	$116,517,930	$57,444,440
Industrial	5	$5,080,016	$3,854,398
Medical	0	$0	$0
Misc	31	$5,871,012	$2,151,439
Parking Structure	1	$0	$0
Public	71	$253,853,685	$209,546,178
Residential	1,861	$1,614,168,655	$1,253,281,743
Tank	10	$3,867,154	$71,045
Total	**2,355**	**$2,110,510,055**	**$1,609,892,910**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 33 Percent of Structures Exposed to Ground Subsidence



4.10.6.3.4 Collapsible Soils

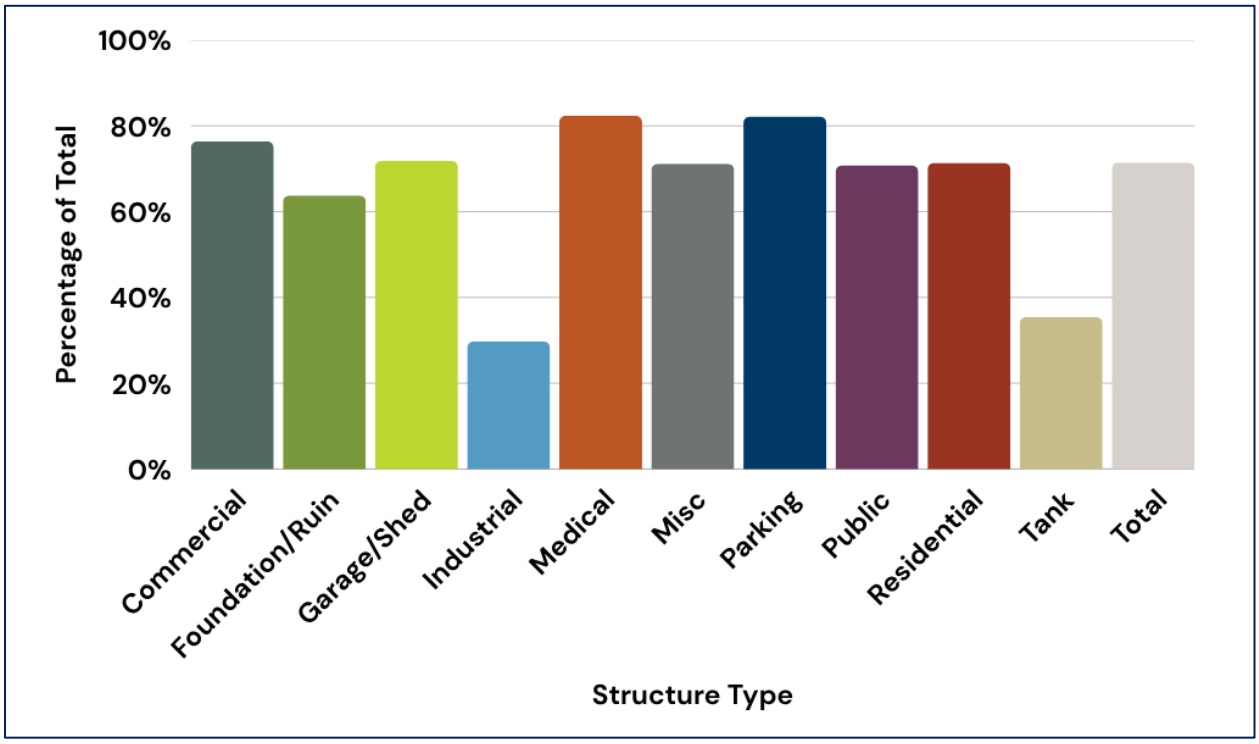
Collapsible soil looks stable when dry but suddenly compact when they get wet or are loaded. This sudden sinking can cause buildings to settle unevenly, leading to cracks in walls, tilted floors, and foundation damage. **TABLE 22** summarizes the total structures by type exposed to collapsible soil areas, and **FIGURE 34** illustrates the percentage distribution of structure count by type. In Jefferson County, residential structures account for the greatest total number of buildings located in collapsible soil areas, while medical and parking structures represent the highest percentage of exposure relative to their structure type.

Table 22 Structures Exposed to Collapsible Soils

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	6,122	$11,241,264,894	$7,721,821,481
Foundation/Ruin	298	$980,250,532	$906,983,561
Garage/Shed	98,055	$7,954,937,030	$4,796,261,568
Industrial	337	$607,444,816	$450,035,461
Medical	75	$282,046,366	$275,987,095
Misc	4,323	$391,026,409	$229,665,762
Parking Structure	37	$411,439,586	$374,329,483
Public	1,288	$1,811,292,844	$1,433,589,665
Residential	124,096	$76,322,124,792	$51,036,274,442
Tank	300	$44,377,658	$17,893,523
Total	**234,931**	**$100,046,204,926**	**$67,242,842,042**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 34 Percent of Structures Exposed to Collapsible Soils



4.10.6.4 Natural, Historic, and Cultural Resources

Soil instability can affect natural, historic, and cultural resources. Erosion reduces soil fertility, damages vegetation, and harms wildlife habitats, putting biodiversity at risk. Excess erosion causes sediment buildup in water bodies, leading to water quality degradation and loss of water storage. Historic and cultural sites in unstable regions face damage risks, especially older buildings prone to foundation settling and cracking. Access to these sites may also be limited if pathways and roads become blocked.

4.10.6.5 Local Vulnerability

Mining voids are a concern in the county, as they can collapse and damage roadways, posing safety risks and disrupting transportation.

4.10.7 Probability of Future Occurrences

Jefferson County has comprehensive development regulations designed to minimize damage caused by dipping bedrock and other geologic hazards in the county. These hazards occur seasonally and annually, generally suggesting a high likelihood. However, mitigation efforts implemented in the county since 1995 should reduce the chances of these hazards causing significant damage. Due to the

widespread presence of swelling soils in the county, the probability rating of ground instability hazards is considered likely.

4.10.8 Climate Change Impacts

Climate change is projected to intensify ground instability hazards in the county, such as erosion, deposition, expansive soils, and subsidence, by increasing temperature extremes and precipitation variability. Warmer, drier spells followed by heavy rainfall can speed up soil erosion and cause slope instability, especially in burn scar and steep areas. Droughts that dry and shrink clay-rich soil, which then quickly re-saturate during storms, raise the risk of ground heaving and uneven settling. Additionally, ongoing drought and fluctuating groundwater levels can worsen subsidence, notably in loose or unconsolidated soils. These effects are intensified by reduced vegetation from wildfires and heat stress, making soils more susceptible to erosion. Overall, these climate-related changes increase the long-term risk of infrastructure damage and land degradation across Jefferson County's foothills and plains.

4.11 Hail

4.11.1 General Background

Most severe storms likely produce hail in the upper atmosphere, but it often melts before reaching the ground. Hailstones fall when heavy enough to penetrate storm updrafts and are pulled down by gravity, sometimes exceeding 100 mph, depending on size and wind conditions.

According to the Rocky Mountain Insurance Information Association (RMIAA), eight of Colorado's top ten hazard events 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. According to the 2023 CO-ESHMP, the damaging hail season in Colorado ranges from mid-April to mid-August. For more general background information on hail in Colorado, refer to the **2023 COLORADO E-SHMP.**

4.11.2 Past Events

Colorado's Front Range, encompassing the entire planning area, lies in the heart of Hail Alley, known for having the highest frequency of large hail in North America and much of the world. An April 2020 report from the National Insurance Crime Bureau (NICB) states that Colorado ranked second in insurance claims related to

hail from 2017 to 2019. Additionally, the RMIIA reports that hailstorms have caused over $5 billion in damage in Colorado over the past decade.

Given that hailstorms are common in Colorado, the most relevant past events to review are those that caused significant damage or other major costs or impacts. The NCEI database lists 494 hail events within the planning area from 1950 to 2024. Of these, 180 storms reported hailstones at least one inch in diameter; however, some records show different hailstone sizes for the same storm, which can slightly distort the data. Several notable incidents, including some not listed in the NCEI database, are described below. These examples highlight the severity of the hail hazard in the area and show the range and risks involved, although they 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 inches of rain and 1-to-3.5-inch diameter hail. There was severe flooding in Arvada, Westminster, Wheat Ridge, and Lakewood. Damage was estimated at $350-$400 million ($1.08-$1.39 billion in 2025) in Jefferson County.

July 11, 1990 – The storm impacted Adams, Arapahoe, Boulder, Denver, Elbert, Jefferson, and Larimer counties, with the heaviest damage reported in Jefferson County. There were observations of hailstones of up to 2.75 inches in diameter and reports of 13 injuries across the Front Range. A companion entry for the same date indicated the hail size was 1.75 inches but that 47 injuries were reported, which were mostly documented in Elitch Gardens (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). Additional accounts indicate that at this time, this was the costliest hailstorm in U.S. history, as hail ranged along the entire Front Range. Jefferson County also suffered severe damage 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 in Lakewood into Golden with 0.75-to-1.5-inch diameter hail and 1.5 to 3.5 inches of rainfall in less than one hour.

October 1, 1994 – An afternoon hailstorm, lasting 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. Overall insured estimates, sourced by RMIIA, totaled $225 million ($493 million in 2025 dollars).

May 22, 1996 – A severe thunderstorm producing large hail ranging in size from 0.75 to 2.0 inches in diameter rumbled across the northwest and northern portions of the Denver metropolitan area. The storm developed near the foothills and moved east northeast across the northern portions of the metro area. The hardest hit areas were the 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 $122 million in insured losses ($251.3 million in 2025). This estimate also included the cities of Golden, Thornton, and Wheat Ridge.

June 8-9, 2004 – A series of hailstorms stretching along the Front Range dropped hailstones ranging from dime-sized 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 also impacted by large hailstorms. Statewide, insurance damages were reported at $146.5 million ($252 million in 2025). This storm was classified as the eighth most costly hailstorm event in state history at the time of the event.

May 24, 2007 – Several fast-moving storms brought significant hail to the foothills southwest of Denver. One hailstorm affected U.S. Highway 285 near Aspen Park, where the state patrol reported two inches of pea-sized hail falling on the roadway, making it snow-packed and slippery. Four accidents followed shortly after, including three roll-overs within 10 minutes. No injuries were reported, and damages were estimated at $20,000 ($31,200 in 2025).

July 20, 2009 – During 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 from this storm is linked to property losses, with 32,900 homeowner claims and 19,500 auto claims filed as of July 27, 2009, totaling approximately $350 million ($528.5 million in 2025) in insurance claims based on preliminary estimates. Although the storm affected the entire Denver metro area, the most severe damage was reported in Jefferson County. At the time of the event, this storm was projected to be the second-costliest natural disaster in Colorado in terms of insured losses.

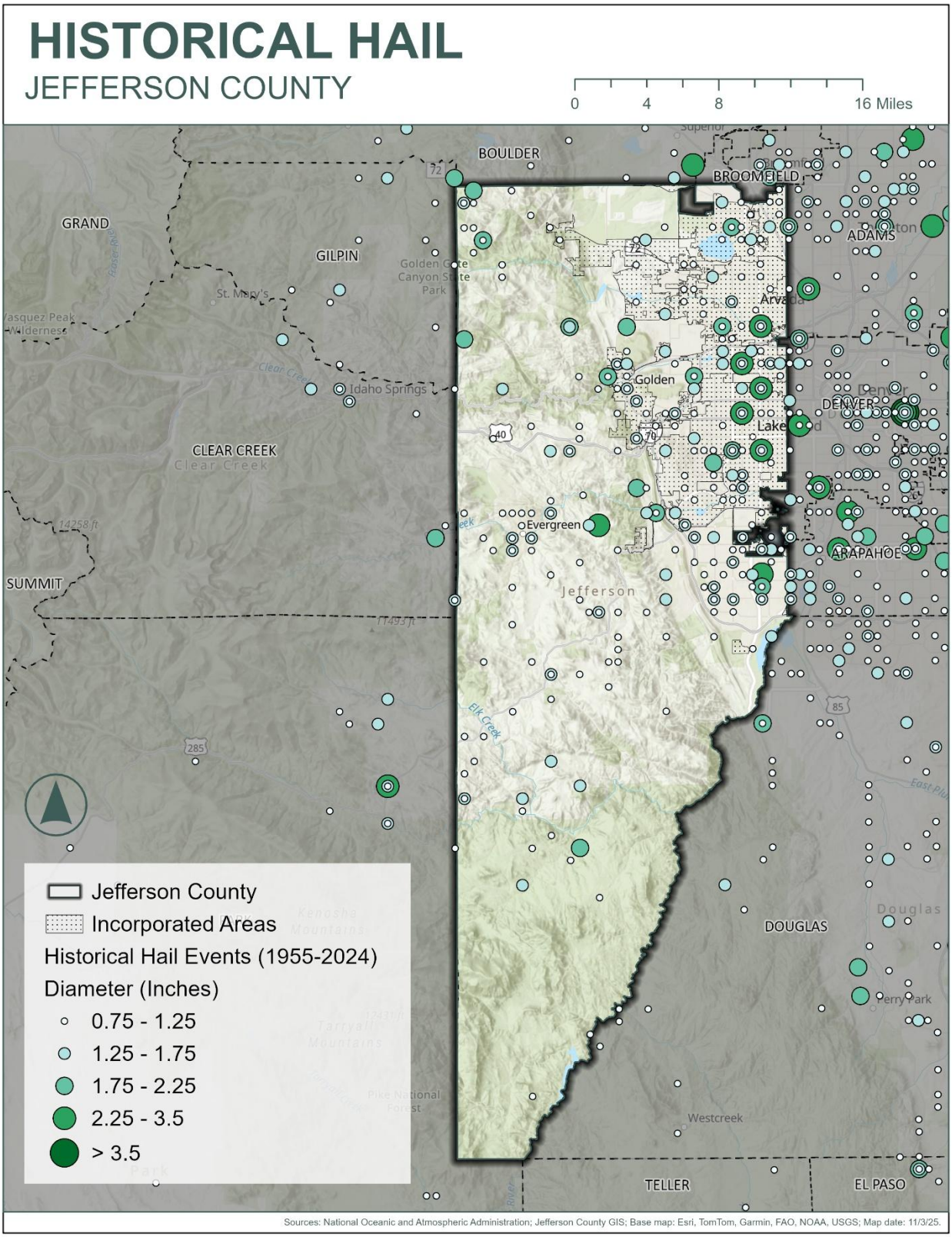
May 8, 2017 – A fierce afternoon thunderstorm became Colorado's most costly insured disaster and the second most expensive hailstorm in U.S. history. Hailstones ranged from 0.75 to 2.75 inches across, depending on the area, impacting a large, densely populated region of Jefferson County, including Lakewood, Arvada, and Wheat Ridge. NCEI reports 150,000 auto insurance claims and 50,000 homeowners' claims. The storm severely damaged the Colorado Mills Mall in Lakewood, causing a six-month closure and an estimated monthly loss of $350,000 in sales and business revenue. Total damage reached approximately $2.3 billion ($3 billion in 2025) across all the communities impacted.

4.11.3 Location

Hailstorms happen during severe storms, which are localized events. Just as snow or rain can vary greatly within a storm, so can hail size, amount, and duration. Typically, hail can fall anywhere in Colorado. The most affected areas are the eastern plains, where hail damages crops and livestock, and the Denver metro area, where it can harm buildings, cars, and trees, and worsen driving conditions. The impact may be limited to a single community or be more widespread, affecting over 50% of the County. Although no known hailstorm has affected more than 75% of the County, hail can occur anywhere in the planning area, but it is unlikely to affect the entire county at once.

FIGURE 35 below illustrates the location and magnitude of hail events within and adjacent to the planning area from 1955-2019.

Figure 35 Past Hail Events



4.11.4 Severity

The NWS classifies hail by diameter and corresponding everyday objects to help the population understand its scope and severity. **TABLE 23** show the hailstone measurements utilized by the NWS. Hailstones that are the size of a quarter (1.0-inch diameter) or larger are considered a severe hail event. The NCEI Storm Events Database records an event in June 1984, with 3.0-inch diameter hail, about the size of a baseball. While this is the largest hailstone Jefferson County has experienced, quarter-sized hail (1.0-inch diameter) is the most common hail size recorded in the database.

Table 23 Hail Size Descriptions

Hail Stone Size	Measurements (inch diameter)
Marble, mothball	0.50
Penny	0.75
Nickel	0.88
Quarter	1
Half dollar	1.25
Ping-pong ball	1.50
Golf ball	1.75
Tennis Ball	2.50
Baseball	2.75
Teacup	3
Softball	4
Grapefruit	4.50

Source: National Weather Service

4.11.5 Secondary Hazards

Secondary hazards often occur after a severe hailstorm, exacerbating initial damage and creating new risks. For example, hail buildup can block drainage, causing localized flooding when additional rain cannot drain away. Additionally, roads covered with hail become very slippery, raising the risk of vehicle accidents.

4.11.6 Exposure and Vulnerability

4.11.6.1 Lifelines

Critical systems such as transportation, utilities, water supply, and communications are particularly vulnerable during hailstorms. Heavy hail can damage electrical substations, transformers, and overhead power lines, leading to widespread outages that disrupt residential, commercial, and emergency services. Water systems may also be harmed if hail punctures pipes or damages treatment facilities, risking water access and quality. Transportation routes like roads, railways, and airports can become hazardous due to hail buildup and debris, increasing accident risks and slowing emergency responses. Communication towers and relay equipment, especially those exposed, are also at risk of damage, which can delay warnings and impede coordination. Damage to these essential networks greatly affects a community's ability to operate, recover, and serve its residents, emphasizing the importance of resilient infrastructure and proactive measures.

4.11.6.2 People

Hailstorm exposure presents the highest danger to people, especially those recreating outdoors during the event or the unhoused populations, who are unable to seek shelter. Large hailstones can lead to serious injuries like bruises, concussions, broken bones, and even death. Vulnerable populations face greater risks; low-income families often live in poorly built homes that are more susceptible to damage and may lack adequate insurance, making recovery more complicated. People with disabilities might need extra help after a major storm, particularly if transportation or utility services are affected. Severe weather alerts should be accessible for those with vision or hearing impairments and those with limited English skills.

4.11.6.3 Structures

Previous event data shows that this hazard causes widespread damage across the entire planning region, with potentially the highest economic impact of all hazards. Hail affects anything exposed, including structures, infrastructure, landscaping, personal property, vehicles, people, agriculture, and livestock. Jefferson County reports the highest number of hail-related injuries in the state. Additionally, hail is the costliest insured loss from natural disasters in Colorado, with nine incidents ranking among the top ten costliest disasters in the state. Existing developments

remain vulnerable due to limited mitigation measures. Vehicles should be parked under shelters to minimize damage costs. Hail severely affects businesses that store outdoor merchandise, like car dealerships, home improvement stores, and garden centers. Damage to landscapes and crops is almost unavoidable since plants cannot be moved indoors during storms.

4.11.6.4 Natural, Historic, and Cultural 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 be at risk of damage from hail.

4.11.6.5 Local Vulnerability

The greatest concern in Jefferson County is damage to vehicles left outdoors during severe weather events. Roof damage to county infrastructure is also a common concern, posing risks to public buildings and services.

4.11.7 Probability of Future Occurrences

The frequency and severity of hail events, which have caused some of Colorado's most costly insured losses, suggest that communities should anticipate ongoing exposure to damaging hail. Continued development, particularly in vulnerable areas, and limited mitigation measures increase this ongoing risk. The probability of future hail events is highly likely.

4.11.8 Climate Change Impacts

Climate change will likely influence Jefferson County's hail events by altering atmospheric conditions that affect storm development and intensity. Although the frequency of hailstorms may not significantly increase, the Jefferson County Climate Action Plan and the CO E-SHMP emphasize that a warmer atmosphere can hold more moisture and energy, resulting in stronger convective storms capable of producing larger, more destructive hail. Located along Colorado’s Front Range, part of the “Hail Alley”, Jefferson County already faces severe hail that causes notable property and crop damage annually. As temperatures rise, shifts in jet stream patterns and storm behavior could move hail risk zones slightly eastward, but the chance of extreme hail and costly damages remains high.

4.12 Lightning

4.12.1 General Background

Lightning is a natural electrical phenomenon that occurs when opposite charges build up in the atmosphere, resulting in a sudden and powerful discharge between clouds or between clouds and the ground. In Jefferson County, lightning poses several risks, including the potential to ignite wildfires, damage buildings and infrastructure, and disrupt power lines. The intense energy from lightning strikes can also harm people and animals, making it a significant local hazard. Additionally, lightning can contribute to cascading hazards such as structural fires and power outages, affecting the safety and resilience of the community. For more general background information on lightning in Colorado, refer to the **2023 COLORADO E-SHMP.**

4.12.2 Past Events

According to records in the NCEI Storm Events Database between 1996 and 2023, Jefferson County experienced 34 recorded lightning events, causing three deaths, 14 injuries, and about $1.47 million in total damage. The following is a summary of damaging lightning events.

June 21, 1996 - A man received minor injuries when he was struck by lightning while working on a ladder in Lakewood.

July 29, 1997 - A woman in Aspen Park received minor injuries when lightning struck her when it passed through the office window. She suffered temporary blindness for approximately 15 minutes.

May 30, 2001 - Lightning ignited a fire that destroyed a luxury home on Bear Mountain near Evergreen. The database reports $1,000,000 in property damage.

August 1, 2001 – Lightning coupled with strong thunderstorm winds knocked out power to approximately 10,000 Xcel Energy customers in Golden.

June 19, 2002 - Lightning damaged the Evergreen Fire Protection District (FPD) repeater. One microwave transmitter, the main fire channel transmitter, and two solar panel controllers were ruined. The database reports $5,000 in damage.

April 29, 2003 - Lightning struck a chimney at a residence in Hiwan Golf Club in Evergreen, sending stones flying as far as 150 feet. Electrical equipment in some

nearby homes also failed. Damage to the residence, in addition to electrical equipment, was estimated to be $100,000.

May 29, 2004 - A father and son practicing on the driving range at the Meadows Golf Club in Lakewood were struck by lightning. The father was killed by the bolt, and his 16-year-old was son seriously injured. Three others standing nearby received only minor injuries.

July 23, 2004 – Lightning caused a power outage in Arvada, leaving approximately 9,800 customers without power for 90 minutes.

May 5, 2007 - A slow moving pacific storm system, ejecting from the Desert Southwest, brought a period of unsettled weather to Northeast Colorado. During the three-day period from May 3rd to May 5th, heavy snow was reported over parts of the Front Range Foothills. Storm totals included: 15 inches near Conifer, 13.5 inches six miles southwest of Evergreen, and 12.5 inches at Pine Junction. Severe thunderstorms, producing large hail and several small, short-lived tornadoes occurred during the period as well. In addition, lightning struck a residence in Jefferson County. The roof of the house was hit, causing the attic to catch on fire. The fire was confined to one room; there were no injuries.

May 19, 2007 - Lightning struck a 33-ft marble statue of Jesus at Mother Cabrini Shrine, in the foothills of Golden. The blast broke off one of the statue's arms and a hand and also damaged a foot. The statue was sent from Italy in five stackable sections in 1954.

July 27, 2007 - A man was struck and killed by lightning while jogging at Matthews Winters Park in Morrison. The thunderstorm, which produced numerous lightning strikes, also caused a power outage at Red Rocks Amphitheatre, forcing the cancellation of a concert scheduled later in the evening.

August 4, 2008 - Lightning sparked a grassfire that consumed 300 acres on the northern edge of Green Mountain, in Jefferson County. Gusty winds and very dry conditions allowed the fire to quickly spread and threaten several houses. Fortunately, there was only minor damage to homes due to smoke and melted siding.

August 8, 2008 - In Evergreen, a man suffered minor injuries when he was struck by lightning. It entered his finger, traveled down his body, and exited his foot.

August 16, 2008 - Severe thunderstorms produced nickel size hail and strong winds. A lightning strike sparked a small grass fire near Quaker Street and Golden Road. It was quickly extinguished by emergency responders. Lightning also struck a tree in Morrison.

May 23, 2011 - Severe thunderstorms produced large hail, up to quarter size, across the northeast plains of Colorado. In addition, lightning struck a metal building in Evergreen and destroyed a nearby storage tank. The blast tossed an eight-inch concrete lid into the air. A park ranger working in the building was uninjured.

June 6, 2012 - Severe thunderstorms broke late in the evening. Lightning struck a home in Lakewood and caused extensive electrical damage.

July 7, 2014 – Severe thunderstorms produced large hail, from quarter to golf ball size, and damaging winds across Arapahoe, Boulder, Elbert and Jefferson Counties. Flash flooding was reported in central Jefferson County. The strong winds downed trees and power lines. A man was injured in Arvada by a nearby lightning strike while recording a thunderstorm video 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 – A strong thunderstorm produced hail up to nickel size in central Jefferson County. Very heavy rainfall was observed across central and southern parts of Denver. Minor flooding was observed when a thunderstorm dropped around 1.5 inches of rainfall in 30 minutes. In Arvada, two men at the Indian Tree Golf Course were struck by lightning when they sought shelter from a rapidly developing thunderstorm under a tree. One man suffered minor injuries, while the other died from his injuries.

May 24, 2023 - A severe thunderstorm produced hail up to quarter size near Parker. Brief heavy rainfall was also observed, with nearly one inch in less than one hour. Lightning struck a home near 38th and Everett in Wheat Ridge and blasted a hole in the roof as well as the ceiling inside. Electrical outlets were damaged and one of the interior walls was charred.

4.12.3 Location

Lightning events in Jefferson County can happen anywhere, but higher elevations are more vulnerable. Elevated terrain, like ridges and mountain slopes, tends to face more frequent lightning strikes because these areas are closer to storm clouds and often act as focal points for electrical activity in the atmosphere. As a result, the likelihood of lightning-related problems, including fires, power outages, and property damage, rises sharply in these higher-altitude regions. Residents and infrastructure in these zones should be especially alert and prepared for lightning hazards.

4.12.4 Severity

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the National Weather Service to define lightning activity on a specific categorical scale. The LAL is a standard parameter used in fire weather forecast nationwide. It is reproduced in **Table 24**.

Lightning can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It also causes forest and brush fires. Due to the county's varied topography, there is a risk of experiencing lightning in any of these categories.

Table 24 Lightning Activity Levels (LAL) Scales

Activity Level	Description
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud-to-ground strikes in five minutes
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, with 6 to 10 cloud-to-ground strikes in five minutes.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, with 11 to 15 cloud-to-ground strikes in five minutes.

Activity Level	Description
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud-to-ground strikes in five minutes.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning.

4.12.5 Secondary Hazards

Lightning events in Jefferson County can trigger a chain of secondary hazards beyond immediate strikes. Wildfires are the primary major concern, especially with dry lightning (LAL 6), which creates high fire risks when ignitions happen without rainfall to suppress flames.

4.12.6 Exposure and Vulnerability

4.12.6.1Lifelines

Lightning events can significantly disrupt critical lifelines in Jefferson County, including transportation, communication, water, and energy systems. Strikes on utility infrastructure often result in widespread power outages, affecting hospitals, emergency services, and water supply facilities. Downed trees or damaged roadways may compromise transportation networks, impeding emergency response and routine travel. Communication systems can also be interrupted, limiting the ability for residents and responders to coordinate during hazardous conditions. These disruptions to essential services amplify the risks posed by severe weather, especially for vulnerable populations who depend on reliable access to lifelines for their safety and well-being.

4.12.6.2 People

People with access and functional needs, including older adults, low-income households, linguistically isolated individuals, people with mobility limitations, and residents in remote areas, may be more severely affected by lightning events because they can face greater barriers reaching safe shelter quickly, and coping

with service disruptions. Power outages are especially dangerous for those who rely on electricity for medical equipment or other essential supports. People who work or recreate outdoors from April through September are at the greatest risk of being struck by lightning.

4.12.6.3 Structures

Lightning strikes can cause significant damage to a wide range of structures. Direct hits may ignite fires in homes, businesses, or public buildings, especially those constructed with combustible materials. In addition to fire risks, lightning can damage electrical systems, appliances, and communication infrastructure, leading to costly repairs and extended service disruptions. Structural integrity may also be compromised if lightning causes explosions, cracks, or the collapse of building components, further threatening the safety of occupants and increasing the need for costly restoration efforts.

4.12.6.4 Natural, Historic, and Cultural Resources

Lightning strikes can also have detrimental effects on a community's natural resources. Strikes may ignite trees, potentially causing wildfires and irreparable harm to historical buildings. As noted under Past Events, in 2007 the marble statue of Jesus at Mother Cabrini Shrine, in the foothills of Golden, was struck by lightning and experienced damage.

4.12.6.5 Local Vulnerability

The greatest concerns in Jefferson County are the vulnerability of radio towers and the safety of recreationalists and tourists using park systems, who may not receive timely warnings. The county currently has four WeatherSTEM units in parks and at a county building, but people must sign up to receive Lookout Alert notifications, and many may be unaware of this system.

4.12.7 Probability of Future Occurrences

The likelihood of future lightning events in Jefferson County remains high, since lightning is a natural weather phenomenon closely tied to thunderstorms, which are common in the region during the warmer months. While predicting the exact frequency or severity of future lightning strikes is difficult, historical patterns indicate that such events will continue to pose risks to the community. The probability of future occurrences of lightning events is highly likely.

4.12.8 Climate Change Impacts

Climate change is projected to lead to more frequent and intense lightning in Jefferson County due to warmer temperatures and increased atmospheric moisture, which foster unstable conditions conducive to thunderstorms. According to the CO E-SHMP, as the climate warms, convective storm activity, particularly along Colorado's Front Range, will likely grow stronger, resulting in more lightning strikes per storm and a longer thunderstorm season. This increase in lightning heightens wildfire risk, especially as prolonged heat and drought dry out vegetation and lower soil moisture.

4.13 Severe Wind

4.13.1 General Background

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 that exceed 50-60 miles per hour. The following are the types of damaging winds that can impact Jefferson County:

- **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.
- **Downslope winds**— Also referred to as Chinook winds, 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.
- **Microbursts**—A small, concentrated downburst that produces an outward burst of damaging winds on the surface. Microbursts are

generally less than 2.5 miles across and short-lived, lasting only five to 10 minutes, with maximum wind speeds up to 168 miles per hour.

- **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.
- **Derecho**—A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary. Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over the 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 to the ground.

For more general background information on severe wind in Colorado, refer to the **2023 COLORADO E-SHMP**.

4.13.2 Past Events

The NCEI Storm Events Database records 378 events between June 1978 and May 2025 where a high wind, strong wind, or thunderstorm wind occurred in or near communities in Jefferson County. Past events resulted in 32 injuries and four fatalities. Of the 378 events, 12 events resulted in recorded property damage, resulting in $26 million in losses; **TABLE 25** highlights this information.

Table 25 Significant Wind Events

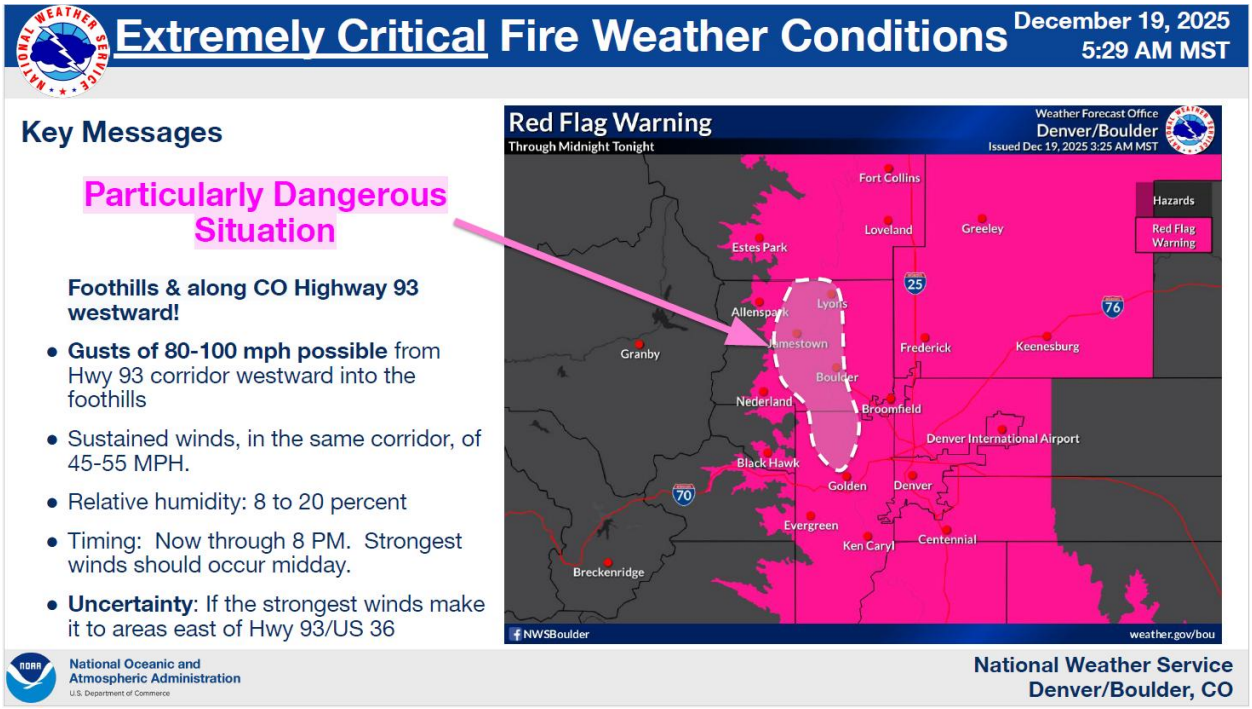
Date	Hazard	Magnitude (knots)	Deaths	Injuries	Total Property Damages
6/9/1987	High Wind	0	1	0	$0
1/3/1996	High Wind		0	3	$150,000
10/29/1996	High Wind	70	1	0	$0
10/29/1996	High Wind	88	0	5	$0
1/21/1997	High Wind	Unknown	0	2	$0

Date	Hazard	Magnitude (knots)	Deaths	Injuries	Total Property Damages
2/2/1999	Thunderstorm Wind	110	0	0	$3,000,000
4/9/1999	High Wind	85	0	0	$13,800,000
5/17/2000	High Wind	73	0	0	$25,000
5/20/2001	High Wind	60	0	0	$112,000
12/20/2004	High Wind	82	0	3	$400,000
1/25/2008	High Wind	52	0	2	$0
12/29/2008	High Wind	76	0	0	$7,000,000
1/7/2009	High Wind	80	0	0	$25,000
1/7/2009	High Wind	70	0	0	$1,000,000
2/17/2009	High Wind	59	0	0	$5,000
2/27/2009	Strong Wind	43	0	0	$20,000
11/12/2011	High Wind	71	0	3	$0
12/31/2011	High Wind	70	1	0	$0
2/10/2017	High Wind	61	0	0	$100,000
1/30/2018	High Wind	70	0	0	$0
4/17/2018	High Wind	89	1	0	$0
12/30/2021	High Wind	94	0	6	$0

During this planning process, a multi-day severe wind event occurred in Jefferson County beginning on December 17, 2025, and continuing through December 19th. The event produced damaging hurricane-force gusts across the county. Reported winds exceeded 100 mph near Rocky Flats and reached nearly 100 mph in Arvada, while conditions in the Jefferson County foothills prompted rare, "Particularly Dangerous Situation" warning, the first time this type of warning for fire weather had been issued in Colorado, because any ignition could have spread rapidly (**FIGURE 36** National Weather Service Warning for December 19, 2025. The event caused widespread and prolonged utility disruptions, including outages and public-safety shutoffs affecting Xcel Energy, United Power, and CORE Electric customers, with some customers still without power days after the first storm. Additional

impacts included support/resource centers in Evergreen and Lakewood, Jefferson County school closures, transportation and transit disruptions, downed trees, blocked roads in foothill areas, and elevated evacuation readiness because of extreme wildfire potential.

Figure 36 National Weather Service Warning for December 19, 2025

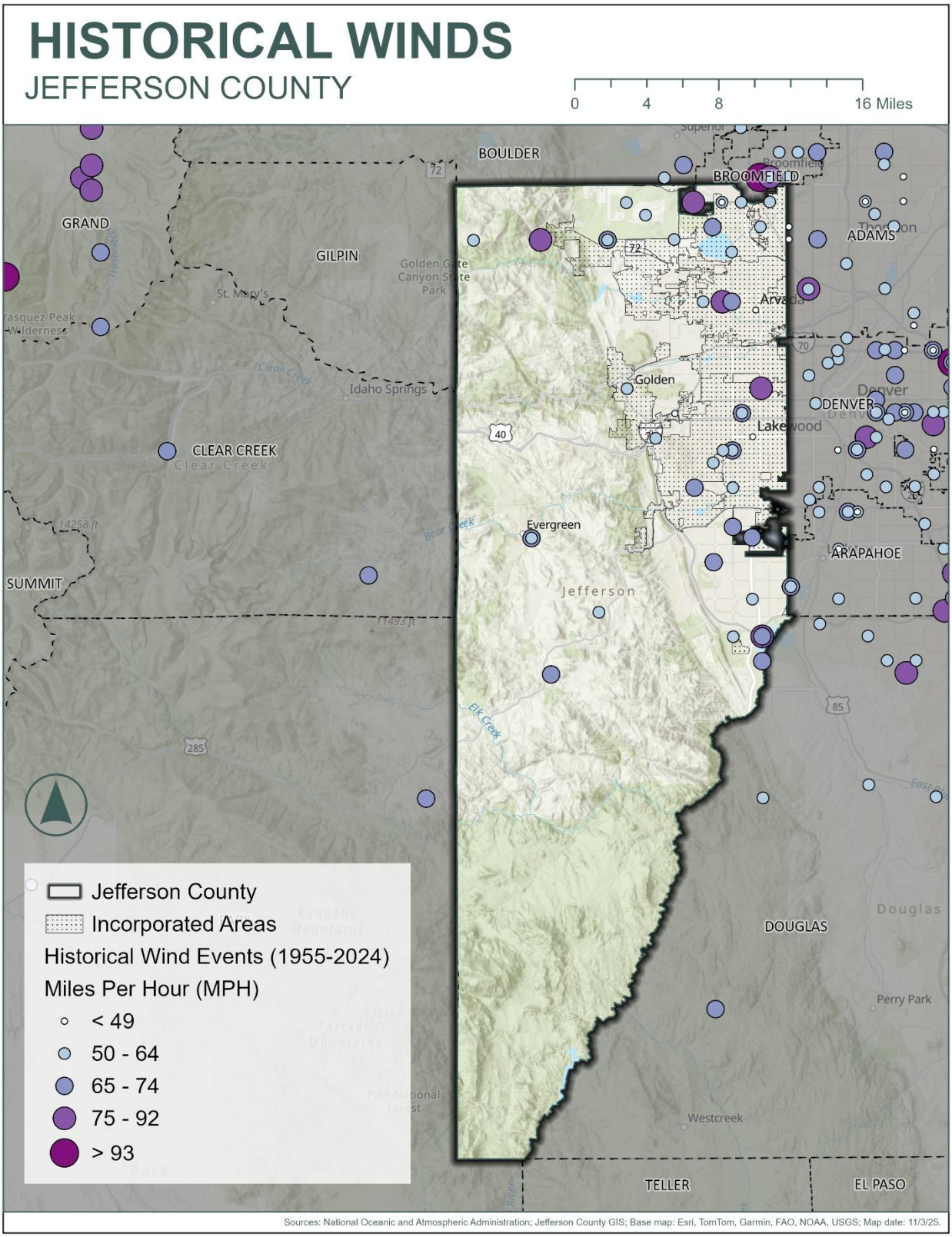


4.13.3 Location

It can be assumed that the entire planning area is exposed 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 power outages. It is common for residents living in more remote county areas to be isolated after such events.

FIGURE 37 shows the location of recorded past severe wind events.

Figure 37 Past Severe Wind Events, 1955-2024



4.13.4 Severity

The Beaufort Wind Scale, recreated in **TABLE 26**, is used to measure the severity of high winds. Hurricane-force winds are defined as a speed equal to or greater than 64 knots (74 miles per hour) or Beaufort Number 12 (Force 12). Hurricane-force winds are not exclusive to hurricanes; they occur in severe thunderstorms. According to the NCEI Storm Events database records, Jefferson County has experienced multiple events that were 12 on the Beaufort Wind Scale.

Table 26 Beaufort Wind Scale

Beaufort Number	Wind Speed (Knots)	Wind Description	Visual Clues
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicated wind direction, still wind vanes
2	4-6	Light Breeze	The wind felt on face, leaves rustle, and vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against the wind
8	34-40	Gale	Twigs breaking off trees, generally impede progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, “considerable structural damage”
11	56-63	Violent Storm	
12	Hurricane	64+	

Source: National Oceanographic and Atmospheric Association

TABLE 27 and **TABLE 28** show the typical levels of damage that can be expected based on windspeed.

Table 27 Damage to Institutional Buildings from Severe Wind Events

Damage Description	Wind Speed Range
Threshold of visible damage	59-88 MPH (72 MPH)
Loss of roof covering (<20%)	72-109 MPH (86 MPH)
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)

Source: National Oceanographic and Atmospheric Association

Table 28 Damage to Electric Transmission Lines from Severe Winds

Damage Description	Wind Speed Range
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

4.13.5 Secondary Hazards

Severe winds can start, accelerate, or make wildfires much less predictable by quickly moving flames through dry foothill vegetation and carrying embers that ignite new spot fires ahead of the main fire. Severe wind can also blow down beetle-killed trees, creating additional fuel for wildfires. Severe wind can also trigger or worsen winter weather by causing sudden whiteout conditions, deep snowdrifts, and dangerous wind chills. Severe wind can also increase erosion and deposition as

described in Section **4.10 Ground Instability Hazards (Erosion/Deposition, Expansive Soils/Heaving Bedrock, Ground Subsidence)**

4.13.6 Exposure and Vulnerability

4.13.6.1Lifelines

Severe wind events in Jefferson County can seriously disrupt essential services by damaging key infrastructure such as power lines, communication networks, and disrupting transportation routes. Wind speeds as low as 80 miles per hour can break wooden cross members, and higher speeds can topple poles, leading to widespread power outages, disruption of emergency services, and restricted access for utility repair crews. Roads may become blocked by fallen trees or debris, impeding ambulances, fire trucks, and other responders. These cascading consequences complicate restoring basic services and raise residents' vulnerability, particularly in remote or exposed areas, highlighting the critical need for resilient infrastructure during extreme weather.

4.13.6.2 People

Windstorms can cause injury and death. 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.

Vulnerable population, including the elderly, low-income, people with life-threatening illnesses, and residents who are already living in isolated areas that may experience further isolation if major roads are blocked or closed by downed power lines. Power outages can be life-threatening for those who depend on electricity for medical support, including oxygen. Responses from the Stakeholder Vulnerability survey shared with the AFN Advisory Group confirmed these impacts. During the December 2025 wind event, one senior healthcare provider noted they were unable to reach patients in their homes to check on them, many of whom needed to receive oxygen, due to downed trees and power lines. The Developmental Disabilities Resource Center also noted that power safety shutoffs and general power outages caused by severe wind events have affected their ability to serve individuals.

4.13.6.3 Structures

All properties are vulnerable during severe wind events, especially those in poor condition or in particularly exposed locations, which may sustain the most damage. Typically, damage is minimal and often goes unnoticed. Properties located at higher elevations or on ridges are more prone to wind damage. Structures near overhead lines or large trees could be at risk if a collapse occurs. Wind exerts direct, frontal pressure on buildings, pushing walls, doors, and windows inward, while gusts can create lift and suction forces that pull surfaces outward. The impact of wind is more severe on the upper floors of multi-story buildings. As positive and negative forces act on a building's exterior (doors, windows, walls), they can lead to roof or structural damage and failure.

4.13.6.4 Natural, Historic, and Cultural Resources

Severe wind events can significantly impact a community's natural, historic, and cultural resources. These strong winds can damage buildings, especially older historic structures, and public spaces like parks and areas with public art. The environment is very vulnerable to high winds, which can cause substantial damage and destruction to natural habitats. Ponderosa pine forests in Jefferson County have been infested by mountain pine beetles, making them more susceptible to being blown down by severe winds. Severe winds may also strip and uproot vegetation, negatively affecting natural ecosystems and agricultural crop yields.

4.13.6.5 Local Vulnerability

Power outages and Public Safety Power Shutoffs (PSPS) are a concern during severe wind events, creating challenges for vulnerable populations, especially those who depend on electricity for medical or essential needs. High winds can lead to major road closures, communication disruptions, and infrastructure failures. Fallen trees can damage infrastructure and block roadways, further complicating emergency response and recovery.

4.13.7 Probability of Future Occurrences

The NCEI Storm Events database recorded 378 severe wind events since 1978, indicating severe wind events occurring annually.

4.13.8 Climate Change Impacts

While strong wind events are common hazards, the CO E-SHMP suggests that a warming climate could produce more powerful storms and greater variability in

wind patterns across the Front Range. Higher temperatures and wildfires lead to droughts and vegetation loss, which can intensify wind effects by increasing dust, soil erosion, and fire spread during high-wind events. Moreover, more extreme temperature contrasts between air masses due to climate change could lead to more frequent or severe downslope windstorms like Chinooks.

4.14 Severe Winter Weather

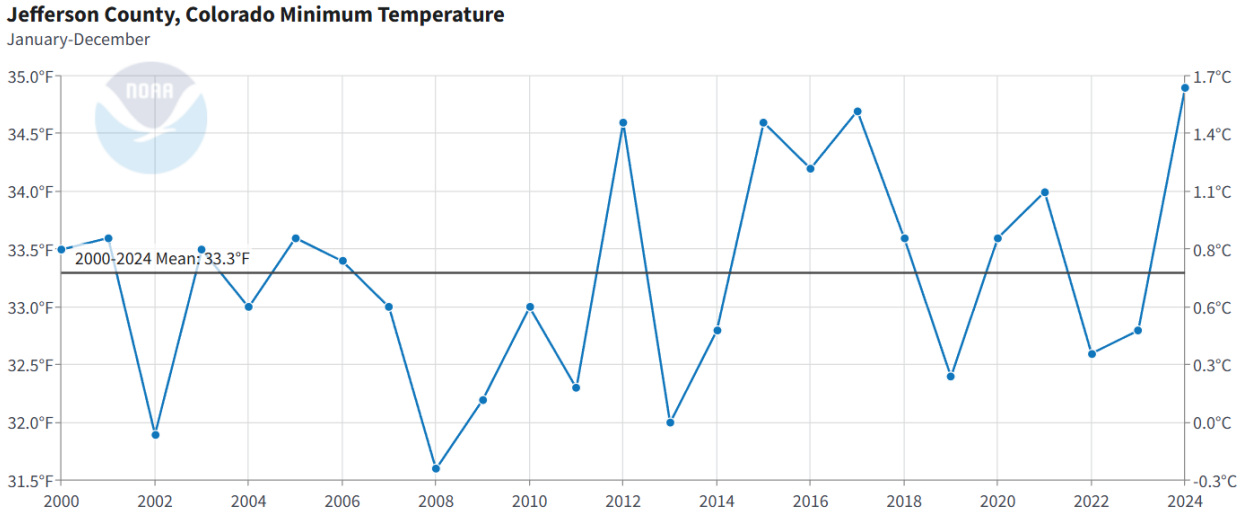
4.14.1 General Background

Winter storms in Jefferson County, including extreme cold, strong winds, heavy snowfall, and blizzard conditions, can cause localized power and phone outages, street, highway, and school closures, business disruptions, and halt non-essential government activities. These storms also increase the risk of winter-weather-related injuries or deaths. Extreme cold, in which temperatures drop dramatically below normal for prolonged periods, heightens the dangers of these events by increasing the risk of frostbite, hypothermia, and other cold-related health emergencies. Heavy snow and blizzard conditions can leave people stranded in vehicles or in places unsuitable for shelter or cut off from essential services. A winter storm can escalate, creating life-threatening situations when severe winter conditions limit emergency response. Other dangers include physical overexertion, which may lead to heart attacks or strokes. Snow removal can be costly, and repairing damage from downed power lines, trees, or structural issues can further strain budgets. For more general background information on severe winter weather hazards including extreme cold in Colorado, refer to the **2023 COLORADO E-SHMP.**

4.14.2 Past Events

According to records collected by the National Centers for Environmental Information (NCEI), Jefferson County's average annual minimum temperature is 33.3°F.

Figure 38 Jefferson County Annual Minimum Temperature



As noted under the extreme heat profile, given the county's topography, temperatures vary across the county. The Western Regional Climate Center (WRCC) reports data summaries from weather stations around the county. **TABLE 29** contains temperature summaries related to extreme cold for the station.

Table 29 Minimum Temperature Data from Jefferson County Weather Stations

Station	Average Annual Minimum Temperature	Daily Extreme Low Temperature	Average Annual # of Days Max Temp < = 32°F	Average Annual # of Days Min Temp < = 0°F
Lakewood[1] (COOP ID: 054762)	37.0°F	-26°F January 12, 1963	19.1 days	5.7 days
Ralston Reservoir[2] (COOP ID: 056816)	39.3°F	-17°F February 3, 2011	19.2 days	4.4 days
Evergreen[3] (COOP ID: 052790)	27.6°F	-38°F January 12, 1963	19.7 days	16.4 days

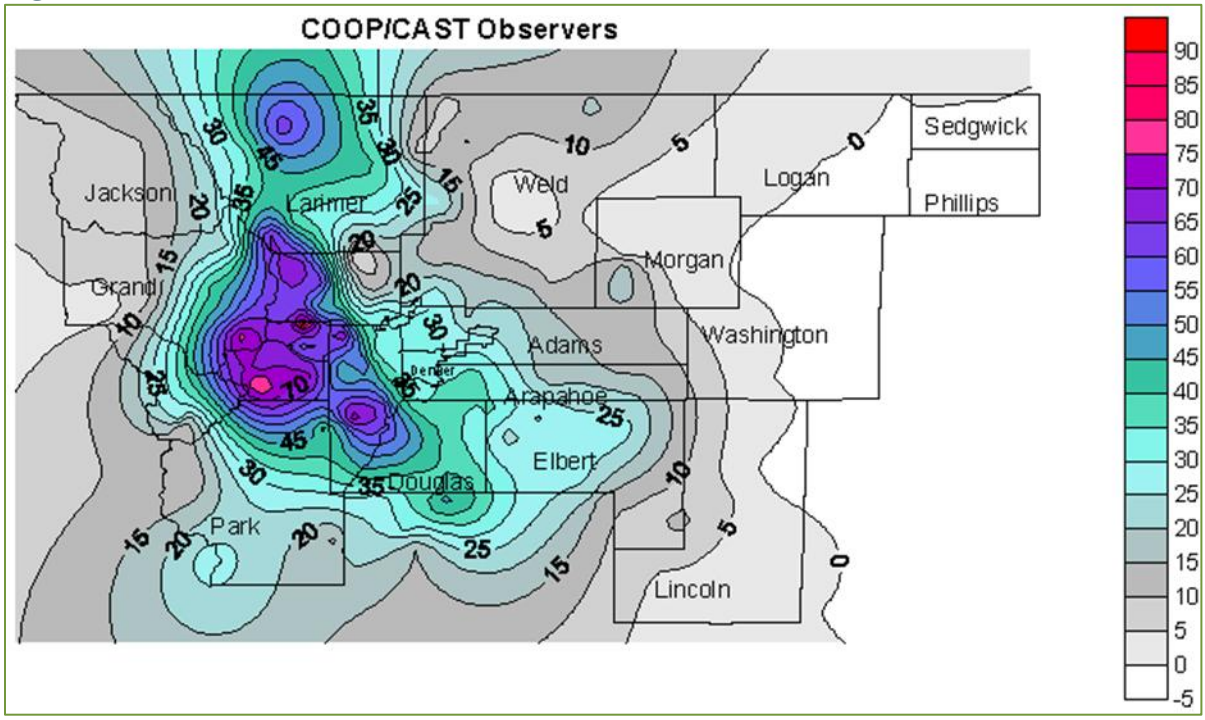
Source: WRCC; (1) Period of Record: June 28, 1962-April 24, 2025; (2) Period of Record: May 1, 1978-September 18, 2025;(3) May 24, 1961–September 18, 2025

The NCEI Storm Events Database lists severe winter weather events by region and organizes events by NWS Public Forecast Zone Boundaries. Of the Public Forecast Zones that include Jefferson County, 541 winter weather events are recorded in the NCEI database between 1996 and May 2025. The March 2003 blizzard is the only event that recorded property damage. The insurance industry estimates this

blizzard to be the costliest winter storm in Colorado history, reporting at least $93.3 million ($160.7 million in 2025 dollars) in claims. The following summarizes the most significant severe winter weather events in Jefferson County as noted in the NCEI database.

March 17 - 20, 2003 – A major snowstorm dumped more than two feet 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 inches of snow fell. Upwards of eight feet of snow were reported in the Evergreen and Conifer areas of Jefferson County by members of the Planning Team. 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. Jefferson County was designated for emergency public assistance from this event.

Figure 39 March 17 – 20, 2003 Snowfall Totals



Source: National Weather Service Forecast Office: Denver/Boulder CO

December 20 and 29, 2006 - Back-to-back major storms occurred in 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 winds drifted the snow 12 to 20 feet high and thousands of animals in the eastern plain were stranded without shelter and food due to 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.

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. This led to significant roads, school, and business closures. Winds were reported to be over 70 miles per hour, causing severe whiteout conditions. One fatality was recorded as a result of the event.

March 13-14, 2021 – The 4th largest snowstorm in Denver's recorded history dropped 27.1 inches 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.

December 21 – 23, 2022 – A powerful arctic outbreak brought some of the coldest temperatures to northeast Colorado in nearly 30 years. Freeze warnings were issued for the record cold temperatures, with –20°F wind chills reported.

January 17 - 18, 2023 – A wet winter storm produced widespread blowing and drifting snow across much of the urban corridor and northeast plains of Colorado. Much of the region received a prolonged period of light to moderate snow, with bands of heavy wet snow from the 17th through the 18th. Storm totals ranged from three to 12 inches, with four to nine inches in the mountains and foothills. Wind gusts of 60 miles per hour in combination with blowing snow caused whiteout conditions, along with drifting snow up to three feet deep.

February 10 – 12, 2024 – A winter storm brought moderate to heavy snowfall to parts of the Front Range foothills and plains of northeast Colorado. Storm totals included 11.8 inches near Genesee, 10 inches near Aspen Park, eight inches, five miles northwest of Golden; 7.5 inches near Kittredge, and six inches near Conifer.

March 14, 2024 – The Planning Team noted that this storm closed portions of I-70 with three feet of snow in Blackhawk in neighboring Gilpin County. The Planning Team also stated that the snowstorm brought over four feet in Genesee.

4.14.3 Location

The entire county is susceptible to severe winter storms and heavy snowfall, with areas at higher elevations being particularly vulnerable.

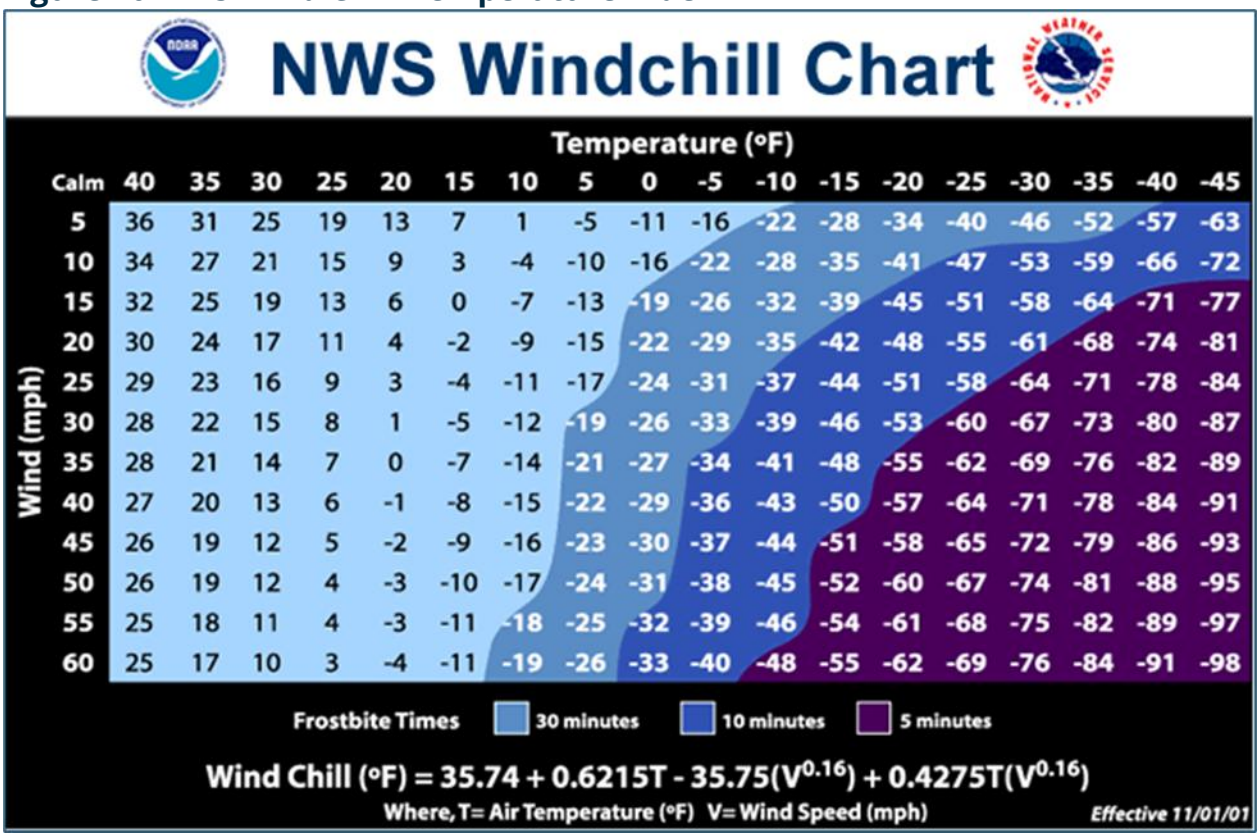
4.14.4 Severity

Winter storms can vary significantly in size, strength, intensity, duration, and impact. High winds can create snowdrifts, block roads, and create dangerous wind chill conditions. Wind chill conditions can become hazardous even without storms or freezing temperatures. The NWS issues a wind chill advisory when wind and temperature combine to produce wind chill values of at least 35° below zero in the mountains.

The NWS refers to winter storms as the "Deceptive Killers" because most deaths are indirectly related to the storm, such as traffic accidents on icy roads and hypothermia from prolonged exposure to cold.

The NWS Wind-Chill Temperature index is shown in **FIGURE 40**. The wind chill is not a direct temperature measurement; 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.

Figure 40 NWS Wind Chill Temperature Index



NWS Windchill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) Effective 11/01/01

4.14.5 Secondary Hazards

Severe winter storms' most significant secondary hazards include falling trees and downed power lines. Fast snowmelt combined with heavy rain can cause overflows and property damage. Heavy winter snowfall may also overwhelm drainage systems, leading to flooding or landslides in spring if the snowpack saturates the soil and melts too quickly.

4.14.6 Exposure and Vulnerability

4.14.6.1Lifelines

Severe winter weather can impact all lifelines in many ways. Heavy snow and ice can damage infrastructure, including roads, bridges, and power lines, leading to power outages and transportation disruptions. Highway closures and power outages may necessitate opening and managing public shelters and delivering mass care. Winter storms might lead to school and business closings, road blockages, and increased snow removal efforts to keep emergency services operational. Roads serving remote areas and those with access and functional needs are particularly at risk. Extended blockages of major routes can interrupt the

shipment of goods and trade. Small ice accumulation can pose serious hazards, especially on power lines and trees. Communication and electrical power may be disrupted for days. These incidents can significantly disrupt transportation systems and delay public safety services.

4.14.6.2 People

Winter weather events mainly threaten public safety by endangering travelers on highways and roads. The most vulnerable groups during severe winter conditions include motorists at risk of being stranded, outdoor activity participants, and individuals with access or functional needs. These groups may experience isolation, exposure to harsh elements, and secondary hazards. Responses from the Stakeholder Vulnerability survey shared with the AFN Advisory Group highlighted the importance of preparing patients and individuals before a severe winter event, as during past incidents, reaching them during or immediately after the storms was difficult until roads became safe. Power outages pose a serious risk to those who rely on electricity for medical devices or are sensitive to cold. Using fuel heaters indoors can lead to poisoning and suffocation. Winter storms often result in injuries and fatalities from car crashes, falls on ice, particularly among older adults outdoors, and hypothermia. Jeffcom 911 has reported increased transportation disruptions, stranded drivers, shelter needs, and heightened demand for emergency notifications and coordination during past severe winter events.

4.14.6.3 Structures

Structures in poor condition or in vulnerable locations—such as hilltops or open, exposed areas—are at higher risk of damage. Those situated beneath or near overhead lines or large trees might be susceptible to falling ice or be damaged if a tree or limb falls.

4.14.6.4 Natural, Historic, and Cultural Resources

Severe winter weather can significantly impact natural resources, historic sites, and cultural assets. Heavy snowfall and ice can cause tree branches to break, harm forests, and alter local ecosystems by disrupting animal habitats or obstructing wildlife movement. Sensitive natural areas like wetlands and waterways may suffer from erosion or flooding due to rapid snowmelt and intense runoff. Historic buildings and cultural landmarks are also at risk, as snow and ice accumulation can weaken roofs, damage masonry, or cause structural failures, especially in older structures. Moreover, ice buildup can damage outdoor monuments and sculptures,

while repeated freeze-thaw cycles may accelerate the deterioration of historic materials, putting the preservation of vital cultural heritage sites in jeopardy.

4.14.6.5 Local Vulnerability

Severe winter weather can cause power outages from downed power lines, disrupt transportation systems, and create challenges for unhoused or other vulnerable populations who cannot safely travel on icy or snow-covered roadways.

4.14.7 Probability of Future Occurrences

Due to its climate and geography, Jefferson County's chance of severe winter weather remains high. It's highly likely that Jefferson County will experience a severe winter weather event in the next one to 10 years.

4.14.8 Climate Change Impacts

Climate change will likely increase the variability and unpredictability of severe winter weather in Jefferson County. This includes heavier snowstorms and more frequent warmer winter temperatures. The CO E-SHMP notes that rising average temperatures lead to more precipitation falling as rain at lower elevations. At the same time, warmer air can hold more moisture, potentially causing heavier snowfall at higher elevations. These changes raise the risk of extreme blizzards, freezing rain, and rapid freeze-thaw cycles, damaging infrastructure and heightening avalanche and rockfall hazards in mountain areas. Additionally, warmer winters may cause earlier snowmelt, reducing snowpack vital for spring and summer water supplies, while sudden cold spells still threaten crops, livestock, and energy systems.

4.15 Slope Failure Hazards (Landslide, Debris Flow, Rockfall, Avalanche)

4.15.1 General Background

The Colorado Geological Survey (CGS) defines landslides as rapid mass movements of soil, artificial fill, and rock down a slope. These earth movements encompass a broad spectrum, from slow soil or rock sliding along a slope to sudden, fast-moving events. Landslides are primarily driven by gravity and can be triggered by factors such as heavy rainfall, earthquakes, volcanic activity, or human interventions.

Various types of landslides include falls, rotational and translational slides, flows, creeps, and topples. In Jefferson County, some common types that pose threats to

people and structures include debris flows and rockfalls. Debris flows are rapid landslides composed of water, soil, rock, and organic material, often initiated by heavy rains or snowmelt. Rockfalls involve the sudden or free-falling movement of rocks from steep cliffs or slopes, typically caused by weathering, freeze-thaw cycles, or seismic activity.

In addition to landslides, avalanches represent another form of rapid downslope movement, specifically of snow, ice, and debris, mainly occurring in mountainous regions. Avalanches can range from small, localized slides to large, destructive avalanches that bury everything in their path. They usually happen in winter and spring when snowpack becomes unstable due to heavy snowfall, warming temperatures, and shifting wind conditions. An avalanche begins when a snow layer becomes unstable, often triggered by factors such as heavy snowfall, temperature fluctuations, or human activities like skiing or snowmobiling, causing the upper snow to fracture and slide down the slope.

For more general background information on slope failure hazards in Colorado, refer to the **2023 COLORADO E-SHMP.**

4.15.2 Past Events

The most useful previous occurrences of slope failure hazards to examine are those that caused a particularly 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 Lyons hogback 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 the hazard was not recognized.

1985 – In the spring of 1985, a landslide directly upslope from Morrison's water treatment plan became active. The problem was mitigated by removing most of the

landslide-prone material, and the issue has not recurred 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 Highway 6 and 93 intersection, 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 being 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 two-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 the 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 burn scar caused by the Schoonover fire in 2002.

June 21, 2005 – A high-profile rockfall event occurred along U.S. Hwy 6 in Clear Creek Canyon, approximately 10 miles west of Golden. Approximately 2,000 cubic yards of rock slid from a pre-existing road cut on the north side of the road and covered the road. Two tractor-trailers caught in the rockfall were pushed off the road by the debris. The tractor-trailers were totaled, but the drivers sustained only minor injuries. The road was closed until the end of August 2005.

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 U.S. 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 periodic maintenance on the area for two to three weeks to repair the damage to the roadway.

2011 – Seven injured in rockfall at Red Rocks Park.

September 2013 – Rainfall on September 9-13th triggered at least 1,138 debris flows along the Colorado Front Range. According to the Planning Team 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 six 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.

2022 – A boulder about 12 feet by 12 feet broke free from a cliff face and rolled into two homes, making them uninhabitable.

No avalanche events have been reported in Jefferson County, but many in neighboring Clear Creek County have indirectly impacted Jefferson County. Avalanche events in Summit County can also affect 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.

4.15.3 Location

Slope failure hazards are 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, along with some residential development.

US Highway 6 in Clear Creek Canyon is prone to rockfall hazards, shown in **FIGURE 41**. 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 area sits directly on top of the Golden Fault, as shown in **FIGURE 42**. 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.

FIGURE 43 shows the debris flow risk for watersheds within Jefferson County. The likelihood and severity of debris flows can increase in areas impacted by wildfire. **FIGURE 44** illustrates the United States Geologic Survey (USGS) Emergency Assessment of Post-Fire Debris-Flow Hazards from the 2024 Quarry Fire. The preliminary hazard assessment estimates the likelihood and volume of post-fire debris flows using empirical models based on historical data, rainfall, terrain, soils, and burn severity. This map indicates the likelihood and potential volume of debris flows at the mountain front in response to a design storm with a 15-minute rainfall intensity of 24 millimeters per hour (mm/h).[4] See the Wildfire Section **4.17.2 PAST EVENTS** for more information on this wildfire event.

[4] **HAZARD ASSESSMENT FAQ - FREQUENTLY ASKED QUESTIONS | U.S. GEOLOGICAL SURVEY**

Figure 41 Rockfall Areas in Jefferson County

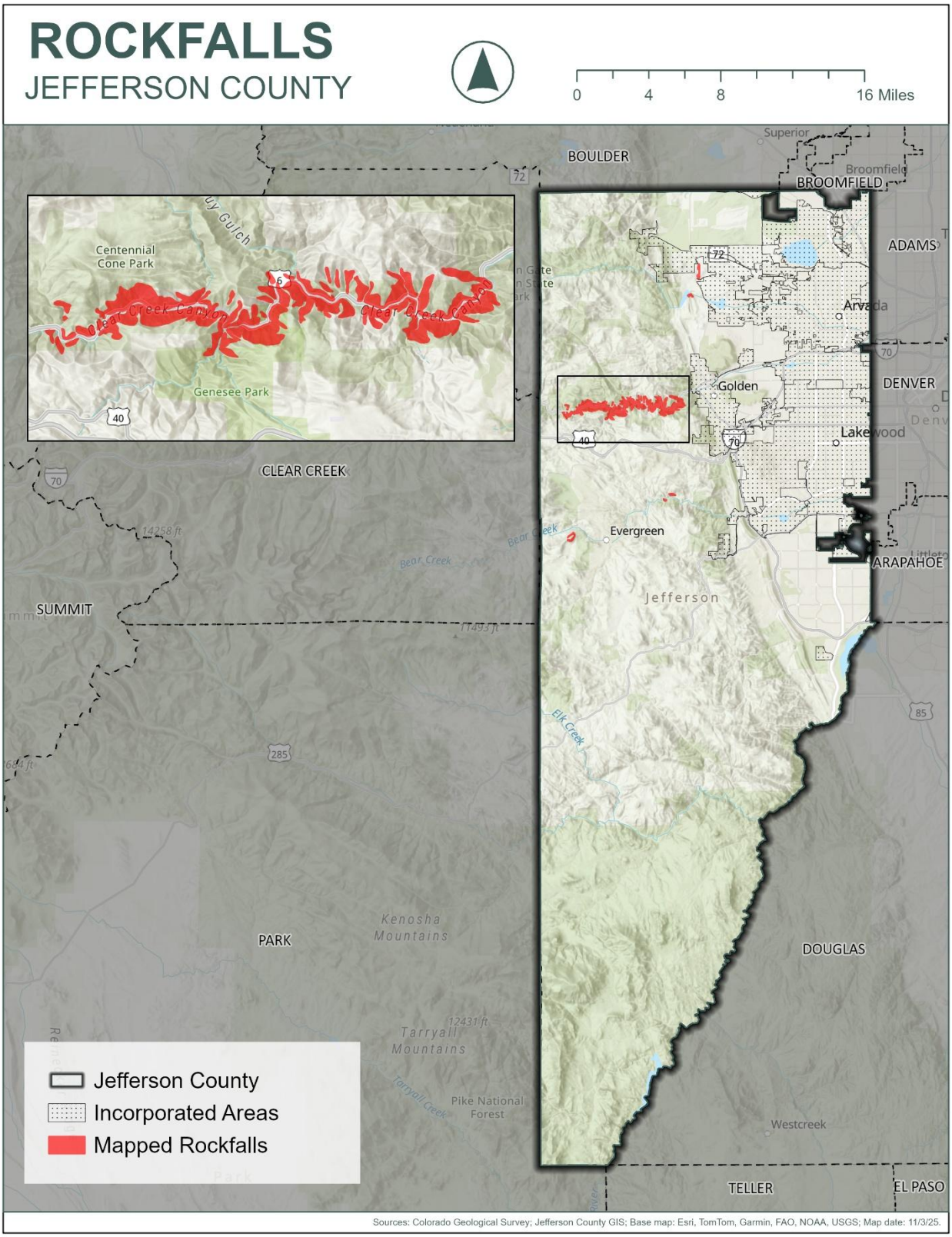


Figure 42 Landslide Areas in Jefferson County

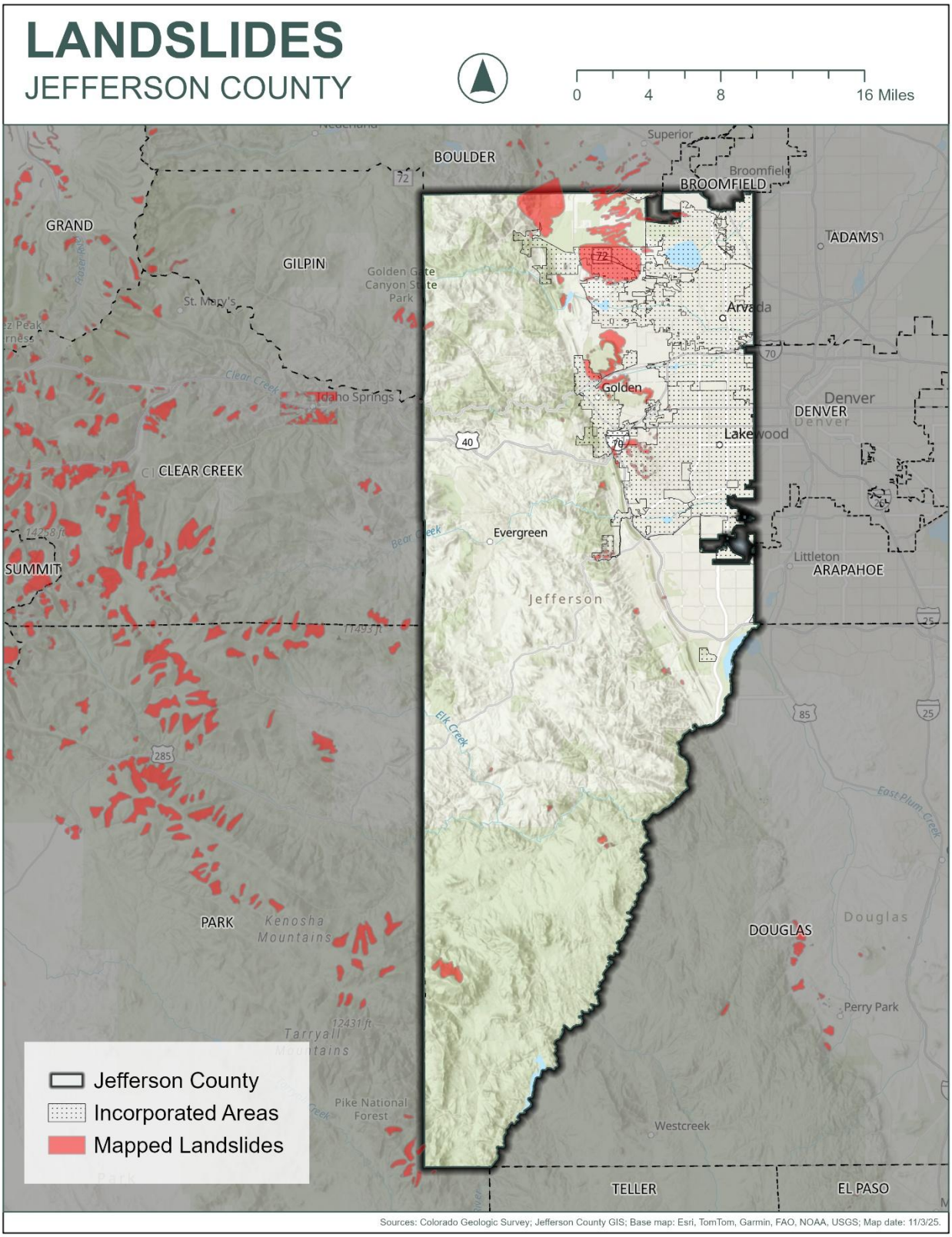


Figure 43 Debris Flow Areas in Watersheds

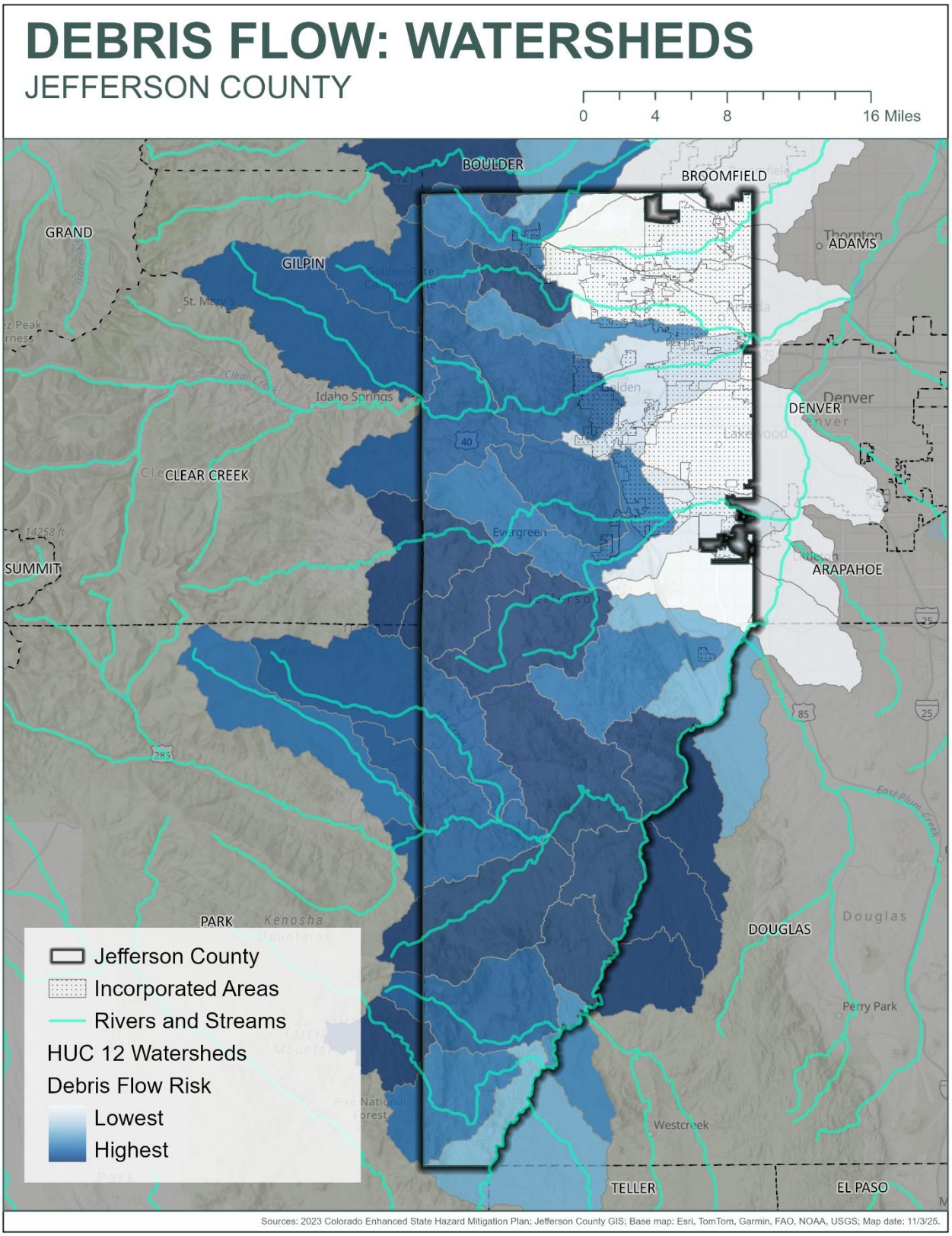
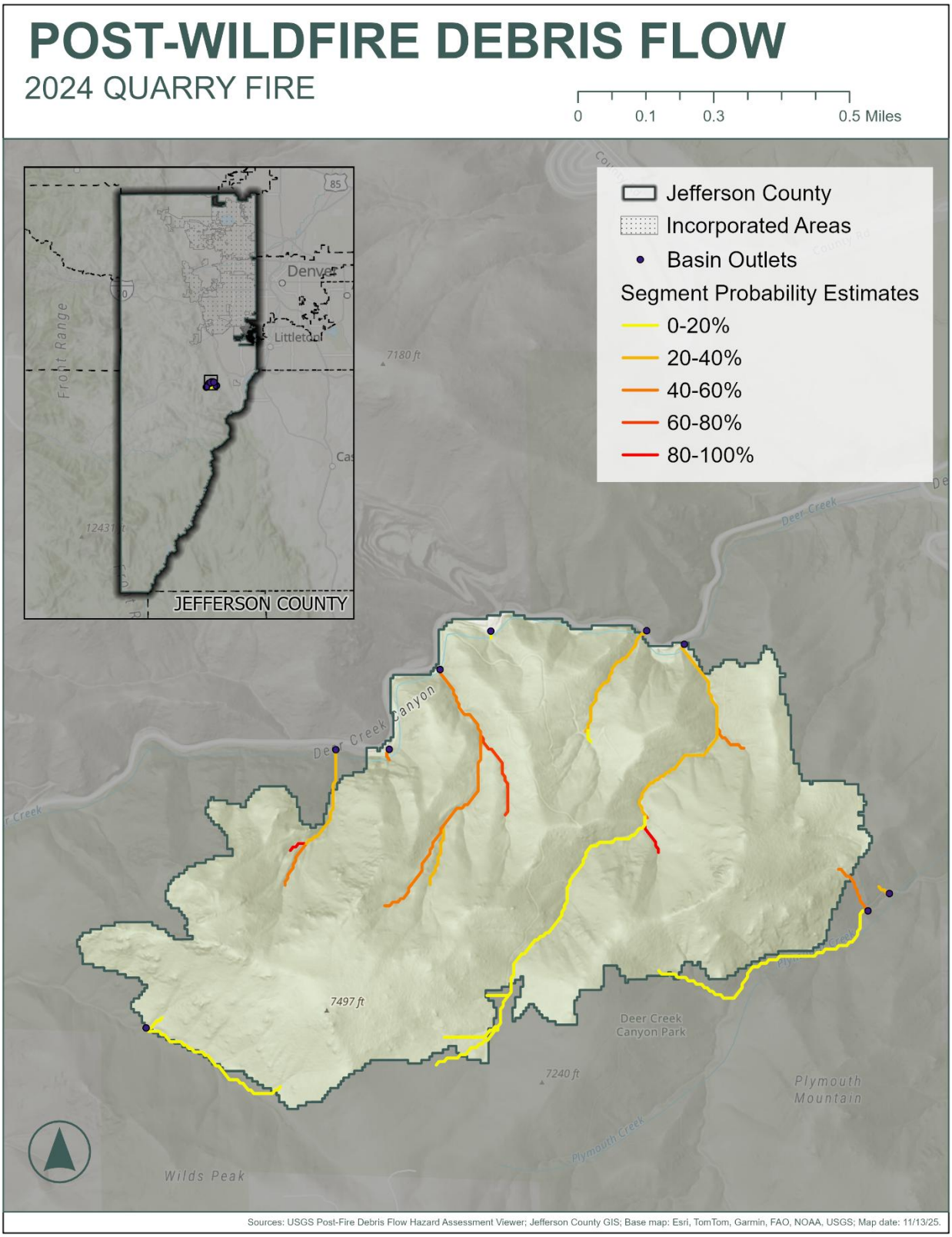


Figure 44 Post-Quarry Fire Debris Flow Hazard Areas



4.15.4 Severity

Landslides, which include debris flows and rockfalls, range from minor soil slips to destructive mass earth movements. Smaller landslides often involve gradual soil shifts that cause minimal damage and frequently go unnoticed. In contrast, severe landslides such as rapid debris flows and large rockfalls can bury homes, harm infrastructure, and endanger lives. Factors like slope steepness, geological composition, and the specific trigger event influence the intensity of landslides.

Property damages from slope failure hazards have been in the millions of dollars, but are generally limited in extent and typically occur during wet cycles. The damage to critical infrastructure is primarily on county highways. This has resulted in a loss or disruption of services periodically in the Clear Creek Canyon US 6 corridor; six past events on US 6 in Clear Creek Canyon are noted in the section **4.15.2 Past Events**, more than other highways noted in the county. By a combination of mitigation efforts and luck there has not been documented deaths from rockfall in Clear Creek Canyon, but the potential remains.

Avalanches can be extremely dangerous, with the potential to cause loss of life, serious injuries, and property damage. The force of an avalanche can be immense, capable of reaching speeds of up to 80 miles per hour. The impact is often worsened by heavy snow, debris, and ice that can bury people.

Table 30 displays the avalanche destructive force scale, which measures the potential severity of damage an avalanche can cause, ranging from minor surface impacts to catastrophic destruction of structures and landscapes. Jefferson County has not experienced an avalanche in the past but has been indirectly impacted by avalanche events in neighboring counties.

Table 30 Avalanche Destructive Force Scale

Size	Destructive Potential	Typical Length	Typical Deposit Volume
D1	Relatively harmless to people	Bus	Average apartment, ≤ 1 meter deep
D2	Injure, bury, or kill a person	Football field	Flood size of a large home, ~2 meters deep
D3	Bury or destroy a car or structure	1 km	Hockey rink, 2-3 meters deep

Size	Destructive Potential	Typical Length	Typical Deposit Volume
D4	Destroy a large truck or 4-hectare forest	2 km	4 hockey rinks, 4 meters deep
D5	Destroy a village or 40-hectare forest	3 km	5+ football fields, 8 meters deep

Source: Avalanche.org, Credit: Bruce Jamieson

4.15.5 Secondary Hazards

Slope failure hazards can trigger secondary natural hazards, increasing destructive effects, including flooding and seismic activity. Landslides can block rivers and streams, forming natural dams. Water buildup in these areas due to landslides may cause dam failures or divert natural streamflow, leading to sudden, severe flooding. Debris flows may also develop as a secondary hazard following avalanches. When an avalanche event removes vegetation and deposits a large volume of loose snow, ice, and fragmented soil and rock within a drainage, the slope becomes highly susceptible to rapid debris-flow initiation once rainfall or snowmelt occurs.

4.15.6 Exposure and Vulnerability

4.15.6.1 Lifelines

Landslides, rockfalls, and debris flows can significantly impact critical lifelines by damaging or blocking roads and bridges, disrupting utility corridors, and threatening water and power infrastructure. These hazards can make transportation routes unsafe or impassable, interrupt electricity and water services, and hinder emergency response operations. Even localized events can create cascading effects, affecting other lifelines, delaying recovery efforts, and increasing risks to public safety and property.

The following sections provide a summary of the lifeline analysis for landslide, rockfall, and debris flow hazard areas, with detailed local breakdowns included in the local government annexes.

Note: There were no mapped avalanche hazard areas in the county, so a lifeline analysis was not conducted for this hazard.

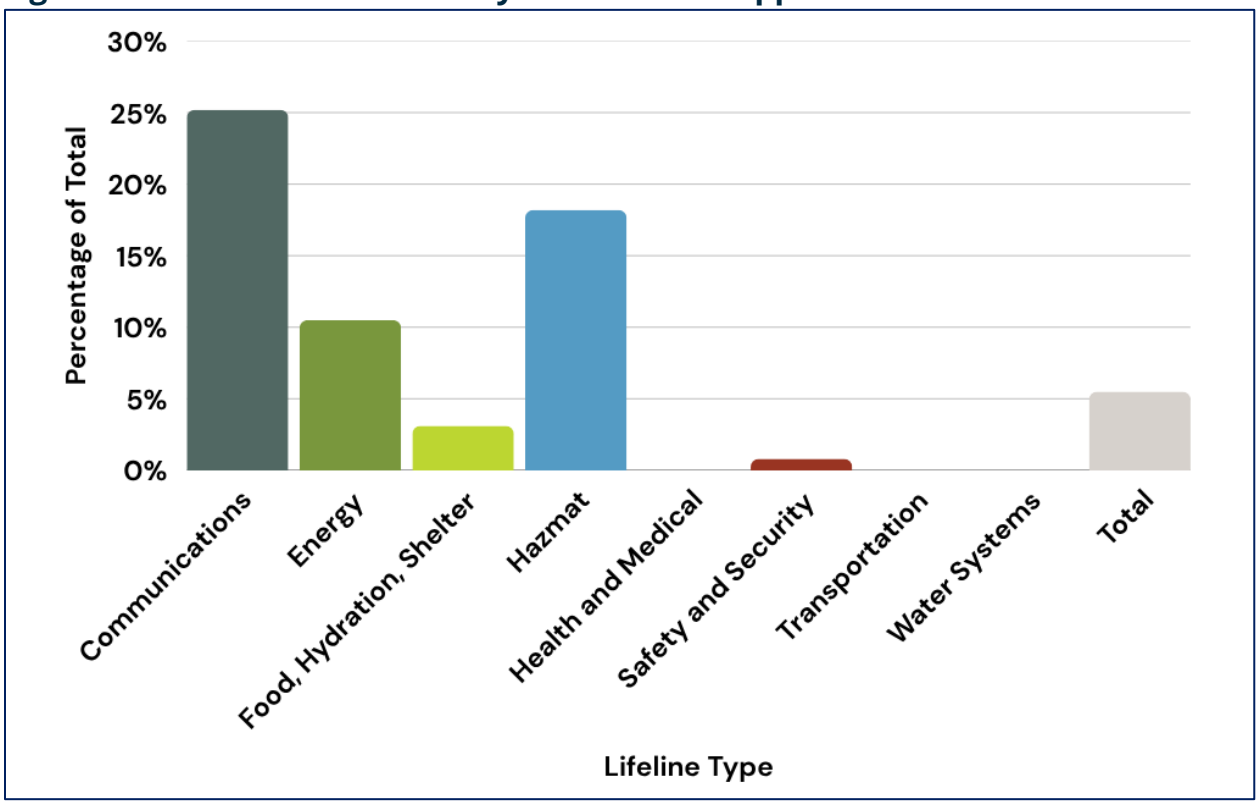
4.15.6.1.1 Landslides

4.15.6.1.1.1 Critical Facilities

The analysis for critical facilities in mapped landslide areas is presented below and shown in **FIGURE 45**. In Jefferson County, communication assets account for the greatest total number of lifelines exposed to landslides.

- **Communications: 73 facilities** (25.2% of total communication facilities)
- **Energy: 6 facilities** (10.5% of total energy facilities)
- **Food, Hydration, Shelter: 1 facility** (3.1% of total FHS facilities)
- **Hazardous Materials: 2 facilities** (18.2% of total hazardous materials facilities)
- **Health and Medical: 0 facilities** (0.0% of total health and medical facilities)
- **Safety and Security: 8 facilities** (0.8% of total safety and security facilities)
- **Transportation: 0 facilities** (0.0% of total transportation facilities)
- **Water Systems: 0 facilities** (0.0% of total water system facilities)
- **Total Community Lifelines: 90 facilities** (5.5% of total lifeline facilities)

Figure 45 Percent of Community Lifelines in Mapped Landslide Areas



4.15.6.1.1.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 57.3 miles of infrastructure, 4.0% of the total system network, located within mapped landslide areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 3.4 miles (0.4%)
- **Energy**
  - Electric Transmission Lines: 26.8 miles (10.7%)
  - Gas Transmission Lines: 12.7 miles (15.4%)
- **Transportation**
  - Major Roadways: 6.7 miles (2.6%)
  - Railway: 7.8 miles (14.9%)

4.15.6.1.2 Rockfall

4.15.6.1.2.1 Critical Facilities

The county does not have any critical facilities situated within mapped rockfall areas.

4.15.6.1.2.2 Lifeline Systems

The analysis of community lifeline systems identified 3.4 miles of infrastructure, 0.2% of the total system network, located within mapped rockfall areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 1.7 miles (0.2%)
- **Energy**
  - Electric Transmission Lines: 0.2 miles (0.1%)
  - Gas Transmission Lines: 0 miles (0.0%)
- **Transportation**
  - Major Roadways: 1.4 miles (0.6%)
  - Railway: 0 miles (0.0%)

4.15.6.2 People

People in areas previously affected by wildfires, drivers on canyon highways, and visitors near steep slopes face increased risks from landslides, debris flows, and

rockfalls. Drivers in canyon areas are specifically at risk, as steep terrain can result in sudden rockfalls or debris flows onto roads, creating immediate hazards. Similarly, visitors engaging in activities near steep slopes may encounter unstable ground, particularly in regions impacted by recent fires or heavy precipitation.

4.15.6.3 Structures

4.15.6.3.1 Landslides

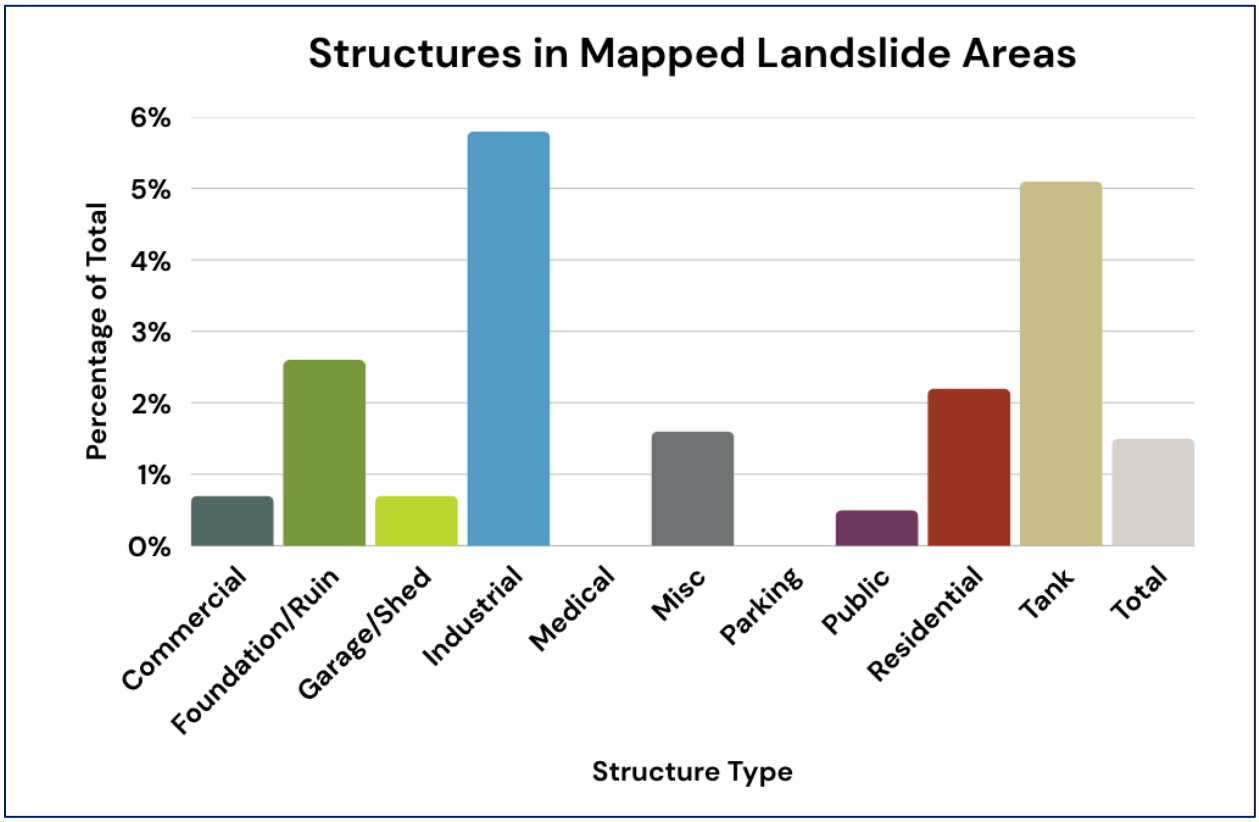
Landslides can impact structures by undermining foundations, causing buildings to tilt, crack, or collapse. Moving soil, rock, and debris can directly strike structures, damage walls and roofs, block access routes, and disrupt utilities such as water, power, and sewage systems. **TABLE 31** below summarizes the number and types of structures in mapped landslide areas across the county, while **FIGURE 46** illustrates the percentage distribution of structures by type. In Jefferson County, residential structures account for the greatest total number of buildings exposed to mapped landslide areas, while industrial structures represent the highest percentage of exposure relative to their structure type. Just over 1% of the county's total structures are located in landslide-prone areas, indicating a relatively low risk compared with other hazards.

Table 31 Structures in Mapped Landslide Areas

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	55	$148,786,024	$111,780,657
Foundation/Ruin	12	$12,062,752	$3,099,846
Garage/Shed	939	$133,498,677	$48,178,463
Industrial	66	$93,846,862	$69,292,580
Medical	0	$0	$0
Misc	97	$8,803,960	$3,373,823
Parking Structure	0	$0	$0
Public	9	$2,600,495	$2,521,521
Residential	3,854	$3,366,584,218	$2,426,671,243
Tank	43	$1,797,575	$394,682
Total	**5,075**	**$3,767,980,563**	**$2,665,312,815**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 46 Percent of Structures in Mapped Landslide Areas



4.15.6.3.2 Rockfalls

The structural analysis of rockfall-prone areas in Jefferson County identified only one tank, with a reported value of $2,239, located within mapped rockfall zones. This indicates that rockfall poses a minimal threat to structures in the county.

4.15.6.4 Natural, Historic, and Cultural Resources

Landslides can severely damage natural, historical, and cultural resources. Forests and wildlife habitats may be destroyed, leading to biodiversity loss and ecosystem disruption.

4.15.6.5 Local Vulnerability

The greatest concern in Jefferson County is post-wildfire debris flow, which can disrupt natural environments, block roadways, and damage infrastructure in its path. Landslides pose a risk to residential areas on North Table, and several roads and bridges are located near identified rockfall zones. The western portion of the county also contains areas susceptible to post-wildfire debris flows.

4.15.7 Probability of Future Occurrences

The risk of slope failures such as landslides, debris flows, and rockfalls remains high, especially in areas impacted by wildfires and heavy rainfall. Loss of vegetation increases slope instability during rain, while development and recreation near steep slopes raise vulnerability. Communities and infrastructure in these regions should expect ongoing threats from slope failures, and the probability of future occurrences is highly likely.

4.15.8 Climate Change Impacts

Climate change is expected to increase the frequency and severity of slope failure hazards such as landslides, debris flows, and rockfalls, in Jefferson County. Hotter, drier summers followed by more intense rainfall events can destabilize slopes by drying and cracking soil and oversaturating them during storms, triggering landslides. The CO E-SHMP also emphasizes that rising temperatures are reducing snowpack stability and changing freeze-thaw cycles, which contribute to increased rockfall and avalanche activity in mountainous terrain. Earlier snowmelt and decreased vegetation from wildfires further lower slope stability, making it easier for heavy rain or rapid runoff to mobilize soil and debris downslope. Jefferson County faces increasing risks to transportation corridors, mountain communities, and critical infrastructure in steep terrain as these climate-driven processes continue.

4.16 Tornado

4.16.1 General Background

A tornado is a violently rotating air column extending from a thunderstorm to the ground. It is often seen as a funnel cloud, which may be marked by debris at its base. Tornadoes can produce destructive winds exceeding 200 mph, capable of causing significant damage to anything in their path. Although they are typically short-lived, tornadoes can travel considerable distances, leaving a trail of destruction behind them. They vary in shape and size, ranging from a few yards to over a mile in width, and can last from several minutes to over an hour. For more general background information on tornadoes in Colorado, refer to the **2023 COLORADO E-SHMP.**

4.16.2 Past Events

According to the NCEI database, 13 documented tornadoes have occurred in Jefferson County since 1965. Most events were F0 and F1 tornadoes with unknown durations and little to no reported damage. All tornadoes 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 47**. 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. 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 damage were unavailable, but no deaths or injuries were reported.

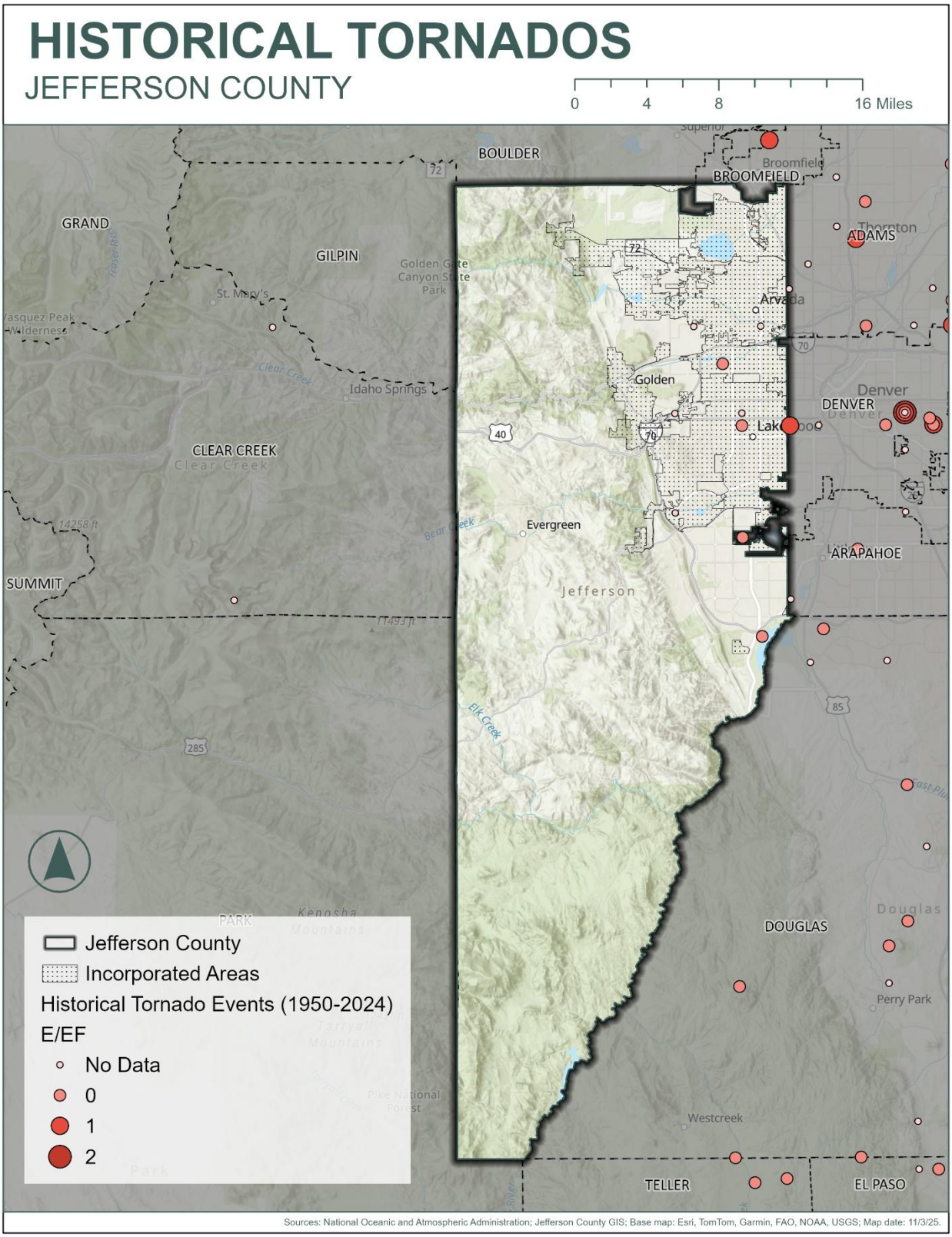
June 15, 1988 – An F3 tornado touched down in Denver County. The event was reported at 200 yards wide and traveled for three miles, causing $25 million in damage. While no one was killed, seven people were injured during the storm.

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 costliest disasters in Colorado history. This event did not impact Jefferson County, but the county did provide assistance to the counties impacted.

4.16.3 Location

Tornadoes can occur anywhere in Colorado, even in mountainous areas. In 2007, a tornado damaged thousands of trees in Woodland Park, Pike National Forest, in Teller County. Teller County touches the southeastern corner of Jefferson County. The severe weather conditions that cause tornadoes are regional events that can affect any part of the county at a given time, making the possible geographic area for tornadoes quite large. However, tornadoes are generally single-point events, similar to lightning. While the entire planning area is vulnerable to tornadoes, the actual frequency of these events at a specific point is very low. **FIGURE 47** shows the location of past tornado events in the county.

Figure 47 Past Tornado Events



4.16.4 Severity

The Fujita Scale, commonly known as the F-Scale, classifies the intensity of tornadoes based on the damage they cause to human-built structures and vegetation. The scale ranges from F0, indicating light damage, to F5, signifying incredible damage. In 2007, the Enhanced Fujita Scale (EF-Scale) was implemented in the United States to provide a more accurate assessment of tornado intensity. The EF-Scale retains the original scale's structure but incorporates more detailed engineering analyses of damage indicators, resulting in a more precise correlation between observed damage and estimated wind speeds. The EF-Scale ranges from EF0, with estimated wind speeds of 65-85 mph, to EF5, with estimated wind speeds exceeding 200 mph.

TABLE 32 compares the Fujita scale to the enhanced Fujita scale. The greatest magnitude tornado Jefferson County has experienced was an F2 on June 3, 1981, which caused $2.5 million ($8.9 million in 2025 dollars) in damages.

Table 32 Fujita Scale Compared to the Enhanced Fujita Scale

Fujita Scale	Wind Speed	Enhanced Fujita Scale	Wind Speed
F-0	40-72 mph	EF-0	68-85 mph
F-1	73-112 mph	EF-1	86-110 mph
F-2	113-157 mph	EF-2	111-135 mph
F-3	158-206 mph	EF-3	136-165 mph
F-4	207-260 mph	EF-4	166-200 mph
F-5	261-318 mph	EF-5	200+ mph

4.16.5 Secondary Hazards

Secondary natural hazards of tornadoes include heavy rainfall and hail associated with severe thunderstorms, which can also cause localized flash flooding, especially when debris clogs culverts or drainage channels.

4.16.6 Exposure and Vulnerability

4.16.6.1 Lifelines

All lifelines across Jefferson County are vulnerable to the impacts of a tornado event. The expected impacts on the energy lifeline are anticipated to pose the most

significant risk to the county, primarily through the loss of power caused by downed power lines.

4.16.6.2 People

The entire population of Jefferson County faces risks from tornadoes, with higher population densities at greater risk. Populations with access and functional needs including older adults (17.9% of the population), low-income individuals (6.7% of the population), linguistically isolated communities, people with mobility challenges, and residents in areas disconnected from main roads, may experience more severe impacts from these weather events. Renters (29.3% of total housing) might find it more difficult to recover after a damaging event, because they have less control over repairs, may lose housing if damaged units are condemned or unavailable, and typically have fewer financial resources or insurance protections than homeowners, making displacement longer and recovery more challenging.

Power outages can be life-threatening for those who rely on electricity for medical support, making the isolation of these populations a significant concern. Additionally, individuals who work outdoors or engage in recreational activities are more vulnerable to extreme weather events.

4.16.6.3 Structures

All infrastructure and buildings are exposed to risks associated with tornado events. Vulnerable structures, such as those in poor condition or mobile homes, may incur the most damage. The age and type of building, as well as the materials and building codes used in construction, all contribute to the likelihood of withstanding a severe wind event with minimal damage. Historic buildings are especially at risk for these reasons.

4.16.6.4 Natural, Historic, and Cultural Resources

Damaging tornadoes can cause large, localized damages to the natural environment, uprooting trees and other debris. Historic properties may be more vulnerable to the wind speeds generated by a tornado due to poor construction practices.

4.16.6.5 Local Vulnerability

Tornadoes are infrequent in Jefferson County, but all above-ground utilities, critical infrastructure, and structures remain vulnerable to tornado events.

4.16.7 Probability of Future Occurrences

There have been 13 documented tornado events in the county since 1965. This corresponds to a probability of future occurrences rating of likely; a tornado event will likely occur somewhere in the county in the next 10 to 50 years.

4.16.8 Climate Change Impacts

Climate change could influence tornado activity in Jefferson County by altering the atmospheric conditions that foster severe storms. While tornadoes are less frequent along the Front Range than in the eastern plains, the CO E-SHMP indicates that a warmer, more humid atmosphere can enhance the energy for powerful thunderstorms capable of producing tornadoes. Rising temperatures increase atmospheric instability, and changes in jet stream patterns coupled with higher wind shear during transitional seasons may expand the spatial and temporal range of tornado risk. Although research linking climate change directly to tornado frequency remains ongoing, there is evidence suggesting that future tornado outbreaks may become more intense and concentrated.

4.17 Wildfire

4.17.1 General Background

Wildfires are uncontrolled fires that rapidly spread through vegetation, posing threats to lives, property, and the environment. While they are a natural component of many ecosystems, helping to clear dead material and promote new growth, factors such as prolonged droughts, rising temperatures, and human activity have increased their frequency and intensity. These fires can damage natural resources, destroy property, and endanger people's safety. The wildland-urban interface (WUI), where human developments meet wildlands, is particularly at risk, as wildfires here can cause significant property damage and loss of life. Additionally, the WUI often borders or encompasses critical watersheds essential for drinking water, agriculture, and ecosystem health.

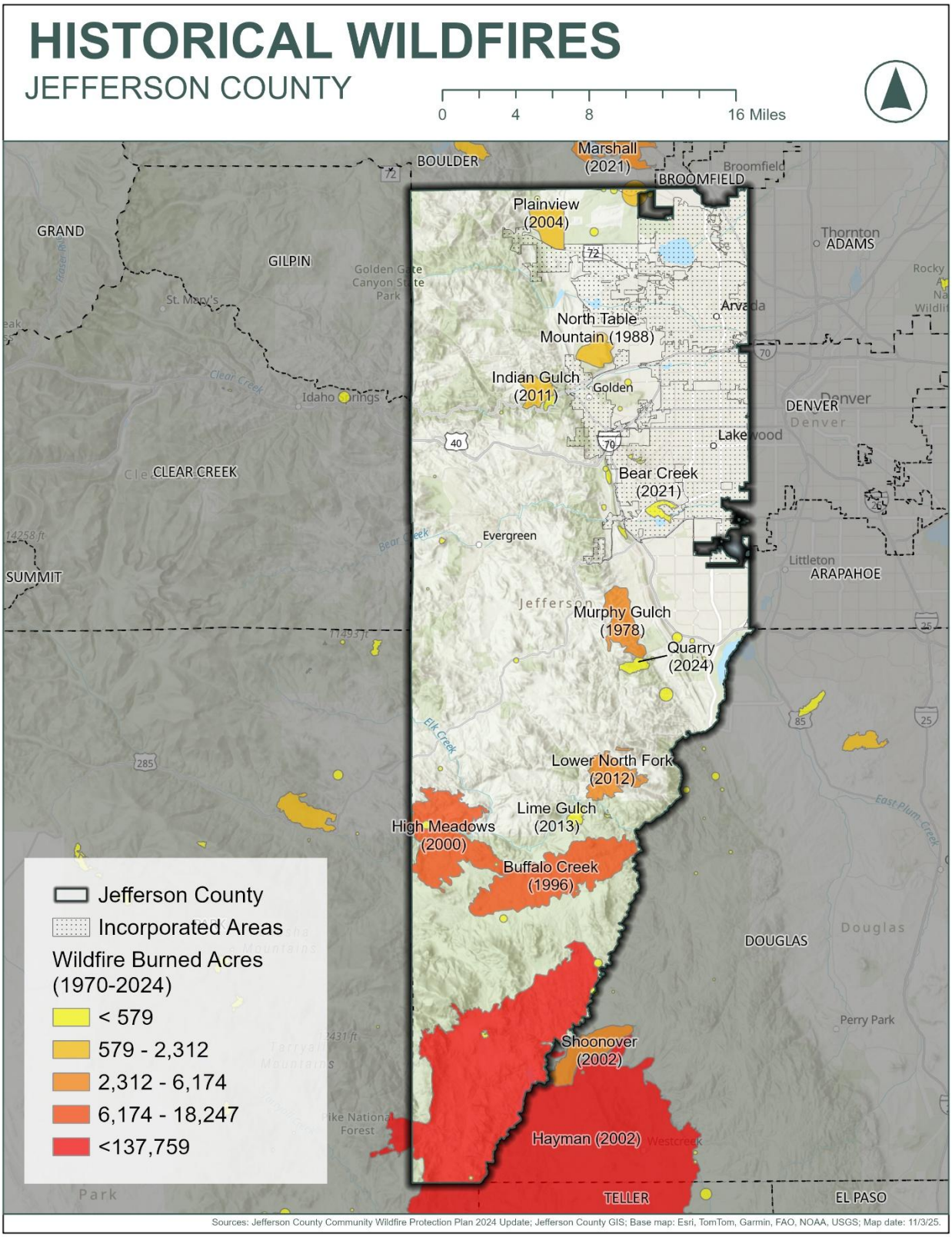
Wildfires ignite when heat, fuel, and oxygen combine. Heat sources may be natural, such as lightning, or man-made, like unattended campfires or discarded cigarettes. Fuel consists of combustible materials such as vegetation, leaves, grasses, trees, and structures. Oxygen sustains the chemical reactions of fire, while winds can provide fresh oxygen and carry embers to new fuel sources, rapidly increasing wildfire spread.

For additional information on wildfire risks and their potential impacts on Jefferson County, please refer to the **2024 Jefferson County Community Wildfire Protection Plan** (CWPP), and for more general background information on wildfire in Colorado, refer to the **2023 COLORADO E-SHMP**.

4.17.2 Past Events

Jefferson County has experienced several significant wildfires in the past. According to the 2024 CWPP, 75,125 acres, equivalent to 15% of the county, burned at least once due to wildfire from 1970 to 2023. The Hayman Fire in 2002 was the largest wildfire in Jefferson County and the fourth largest in Colorado history, only to be surpassed in 2020 by three larger fires. **Figure 48** shows the location of past wildfire events.

Figure 48 Jefferson County Past Wildfire Events



Narratives from significant fire events in the county are provided by the previous 2021 Jefferson County Hazard Mitigation Plan and the 2024 County CWPP:

- **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 led 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 five 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 areas and human-caused fire led 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 close out.
- **June 12-25, 2000** – The High Meadow Fire (FM-2309), 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. Fifty-two 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, including several caused by lightning. The control costs were estimated at $3.5 million ($6.58 million in 2025) 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 (DR-1421) was the most severe fire season on record in the state of Colorado and in particular for

Jefferson County and the Front Range communities prior to the 2020 fire season. The year 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 damage 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 Sheriff's 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 four 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 two 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 one bridge were lost and two 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 Cheesman Reservoir and South Platte Watershed areas. The fire is considered a nationally significant WUI fire for Colorado and the Rocky Mountain region. The Hayman Fire was the largest wildfire in Jefferson County and the fourth largest in the state, at the time. 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 on 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 were 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 20, 2011** – The Indian Gulch Fire (FM-2873) started in Clear Creek Canyon, west of Golden, in steep, rugged terrain above U.S. Highway 6. The fire was determined to be human-caused and burned over 1,500 acres before being fully contained.
- **March 26-31, 2012** – The Lower North Fork Wildfire (FM-2975) 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. 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 was driven by the strong winds, quickly advancing 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 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. While no homes were lost, many residents were evacuated overnight.
- **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 the fire front, necessitating several evacuations. Approximately $10,000 worth of fencing was destroyed, but further property loss was averted through 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.
- **July 30 – August 7, 2024** – The Quarry Fire (FM-5526) ignited in Deer Creek Canyon as a small vegetation fire that rapidly expanded. The fire burned through steep; rugged terrain covered with dry grass and scrub oaks. Mandatory evacuations were issued for the Deer Creek Mesa, Sampson, Maxwell, McKinney, and Murphy subdivisions and roads

closed.[5] The fire burned 579 acres in the Deer Creek Canyon Park, 35% of the park property, impacting several trails.[6]

- **August 20, 2024** - The Goltra Fire ignited in Clear Creek Canyon west of Golden. The fire, fueled by steep terrain and strong winds, grew rapidly and burned 205 acres. Lightning is considered the cause of the fire. To assist firefighters in response efforts U.S. Highway 6 was closed in both directions from Colorado 58 to Highway 119.[7] The Planning Team noted that the Goltra Fire threatened watershed intakes in Clear Creek.

4.17.3 Location

The risk of wildfires in Jefferson County is highest in the WUI, where homes and infrastructure are located near forested or grassland zones. These areas, covering all local government jurisdictions within the county, are especially vulnerable because they blend populated regions with natural landscapes that can fuel wildfires. Assets like homes, businesses, and critical infrastructure face significant danger, especially during the warmer months when conditions are dry and winds are strong. WUI Risk areas are shown in **FIGURE 49**.

4.17.4 Severity

Wildfires in Jefferson County often ignite due to dry weather, strong winds, and abundant vegetation. These fires tend to spread rapidly, particularly in the WUI, where homes are situated near forests or grasslands. They pose threats to residences, infrastructure, and farmland. The area's rugged terrain in the western portion of the county, characterized by steep slopes, complicates firefighting efforts and can intensify fires, leading to swift and unpredictable spread. Additionally, wildfires can harm natural resources such as wildlife habitats, forests, and watersheds, impacting both the environment and the local economy.

In Jefferson County, the risk of wildfire is relatively high, with a large portion of the county being in the highest intensity wildfire risk areas. These areas are shown in **FIGURE** 50.

[5] https://www.cpr.org/2024/07/31/quarry-fire-wildfire-south-jefferson-county-subdivision-evacuations-near-deer-creek-canyon/
[6] https://www.denvergazette.com/2025/08/01/jeffco-park-reopens-following-2024-quarry-fire-2d8b0bef-8fee-490a-9ec1-5c7d4a38d197/
[7] https://www.cbsnews.com/colorado/news/goltra-fire-colorado-wildfire-smoke-smells-smoky-highway-6-closed-golden-lookout-mountain/

The mountain pine beetle (MPB), although native to the western U.S., can cause significant damage to pine forests when stands are dense, unhealthy, or stressed by drought, heat, or other environmental factors that enable beetle populations to reach epidemic levels. In Jefferson County, ponderosa and lodgepole pines are the most affected species, and MPB activity has steadily risen since 2023. According to the County's Invasive Species Management department, the last major outbreak occurred from 1996 to 2004, and such events typically happen every eight to 20 years. As of October 2025, the Colorado State Forest Service reports increased MPB infestations in parts of the county's ponderosa pine forests.

MPB outbreaks directly impact wildfire behavior and risk. When beetles kill large numbers of trees, the standing dead trees that still have dry needles can ignite more easily and burn hotter, raising the chances of fast-moving crown fires. The accumulation of dry, fallen woody debris can further intensify fire behavior, increase flame lengths, and complicate suppression efforts. Together, these factors increase both the likelihood and severity of wildfire events in forests affected by MPB.

Figure 49 Jefferson County Wildland Urban Interface (WUI)

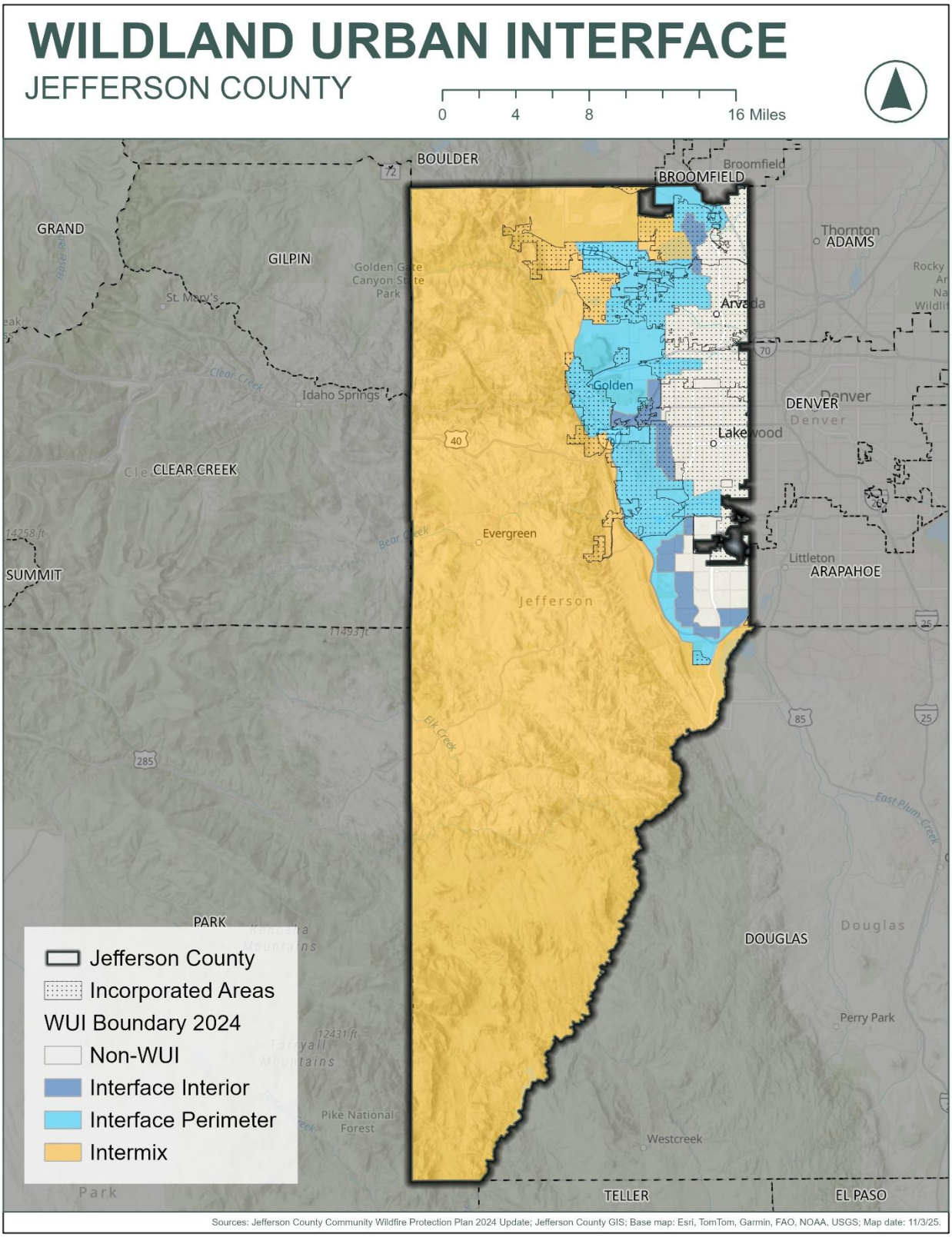
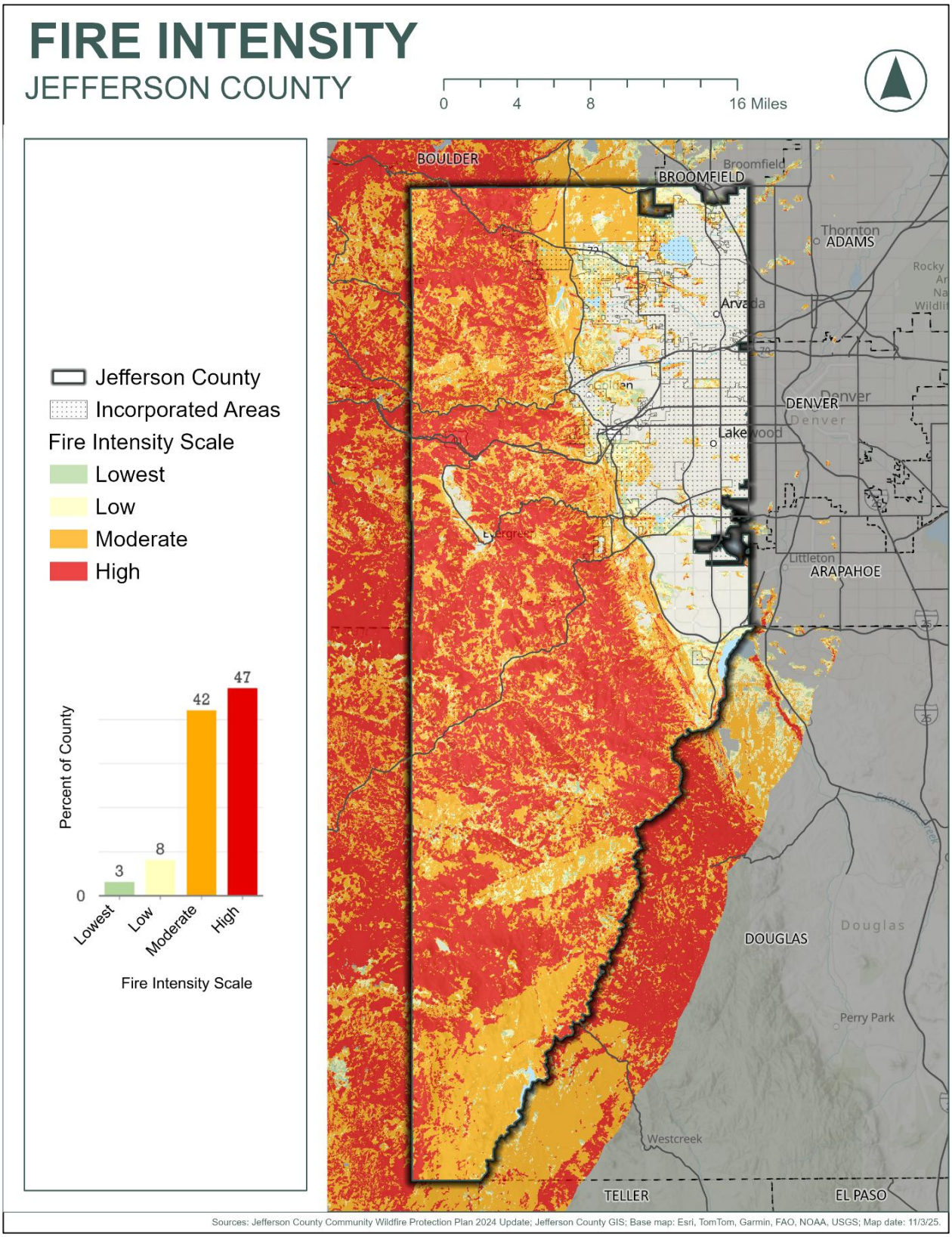


Figure 50 Jefferson County Wildfire Risk (Intensity)



4.17.5 Secondary Hazards

Post-wildfire zones are vulnerable to debris flows and landslides because vegetation loss results in unstable soil. Heavy rainfall can initiate significant earth movements in these areas. Additionally, the heat from fires can render the soil hydrophobic, increasing the risk of flash floods during thunderstorms.

4.17.6 Exposure and Vulnerability

4.17.6.1 Lifelines

Wildfires can significantly impact critical lifelines by damaging or destroying roads, bridges, utility lines, communication networks, and water and power infrastructure. Intense heat and flames can physically damage transmission lines, substations, and pumping stations, while smoke and ash can interfere with electrical equipment and communications. Roads and bridges may become unsafe or impassable, limiting access for emergency response and evacuation. Even localized fires can create cascading effects, disrupting multiple lifelines simultaneously, delaying recovery efforts, and increasing risks to public safety, property, and essential services.

The following sections provide a summary of the lifeline analysis for wildfire hazard areas, with detailed local breakdowns included in the local government annexes.

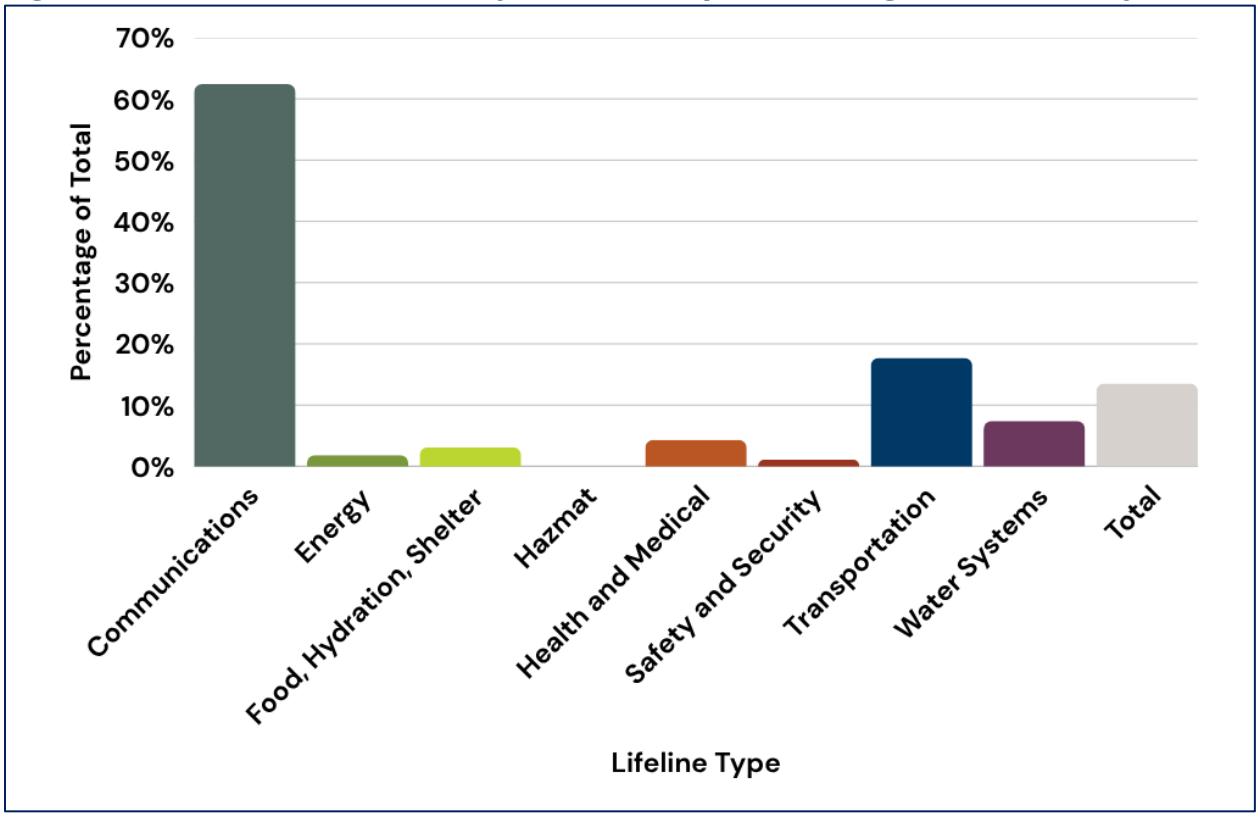
4.17.6.1.1 Critical Facilities

A critical facilities analysis was conducted for wildfire risk areas, focusing specifically on locations exposed to the highest levels of wildfire intensity in Jefferson County. The analysis for critical facilities in the highest wildfire intensity areas is presented below and shown in **Figure 51**. The analysis found that the communication lifeline has the highest total exposure, both in terms of overall count and as a percentage of critical facility types.

- **Communications: 181 facilities** (62.4% of total communication facilities)
- **Energy: 1 facility** (1.8% of total energy facilities)
- **Food, Hydration, Shelter: 1 facility** (3.1% of total FHS facilities)
- **Hazardous Materials: 0 facilities** (0.0% of total hazardous materials facilities)
- **Health and Medical: 4 facilities** (4.3% of total health and medical facilities)
- **Safety and Security: 10 facilities** (1.1% of total safety and security facilities)
- **Transportation: 14 facilities** (17.7% of total transportation facilities)
- **Water Systems: 9 facilities** (7.4% of total water system facilities)

- **Total Community Lifelines: 220 facilities** (13.5% of total lifeline facilities)

Figure 51 Percent of Community Lifelines Exposed to High Fire Intensity Areas



4.17.6.1.2 Lifeline Systems

Additionally, the analysis of community lifeline systems identified 90.9 miles of infrastructure, 6.4% of the total system network, located within wildfire areas. A summary of this data is provided below.

- **Communication**
  - Fiber-Optic Cables: 26.4 miles (3.4%)
- **Energy**
  - Electric Transmission Lines: 27.9 miles (11.1%)
  - Gas Transmission Lines: 11.6 miles (14.2%)
- **Transportation**
  - Major Roadways: 22.5 miles (8.9%)
  - Railway: 2.5 miles (4.8%)

4.17.6.2 People

Wildfire events can have especially severe impacts on access and functional needs individuals in Jefferson County because evacuation often depends on timely warnings, accessible transportation, caregiver support, medical continuity, and safe sheltering, all of which can break down under fast-moving fire conditions. Jefferson County's 2024 Evacuation Annex recognizes that some areas have limited ingress and egress, roads can become impassable, and evacuation assistance may be needed for people with disabilities and others without access to personal vehicles. According to the U.S. Census American Community Survey five-year estimates, 4% of residents in the county have no access to a vehicle, and 29% have access to only one vehicle. Those risks are reinforced by the county's 2024 CWPP, which highlights that residents are especially concerned about roadway capacity and receiving timely evacuation information and specifically identifies adults with disabilities and functional needs, people with durable medical equipment, and others needing additional care as priority considerations in wildfire evacuation planning. Delayed or poorly targeted alerts can leave vulnerable residents without enough time to evacuate, and people with mobility limitations may be unable to do so if accessible vehicles, paratransit, or caregiver support are unavailable.

As reflected in the stakeholder vulnerability survey shared with the AFN Coordination Group, these impacts are already being felt locally. The Front Range Animal Evacuation Team notes that they assist people and their animals with evacuation every year due to wildfires. One senior healthcare provider has noted assisting individuals with evacuations during past wildfire events. Jeffcom 911 reported that past impacts have included evacuations (pre-evacuation and mandatory), road closures, public safety power shutoffs, degraded air quality, and extended operational periods requiring sustained emergency communications and notifications.

In addition to the immediate danger from rapidly spreading flames, wildfire smoke can seriously affect people with respiratory conditions, heart disease, older adults, children, and others with existing health concerns, while prolonged smoke exposure can worsen both short- and long-term health outcomes.

4.17.6.3 Structures

Wildfire can pose serious risks to structures by directly burning buildings, damaging roofs and walls, and weakening structural components. Even if flames do not reach

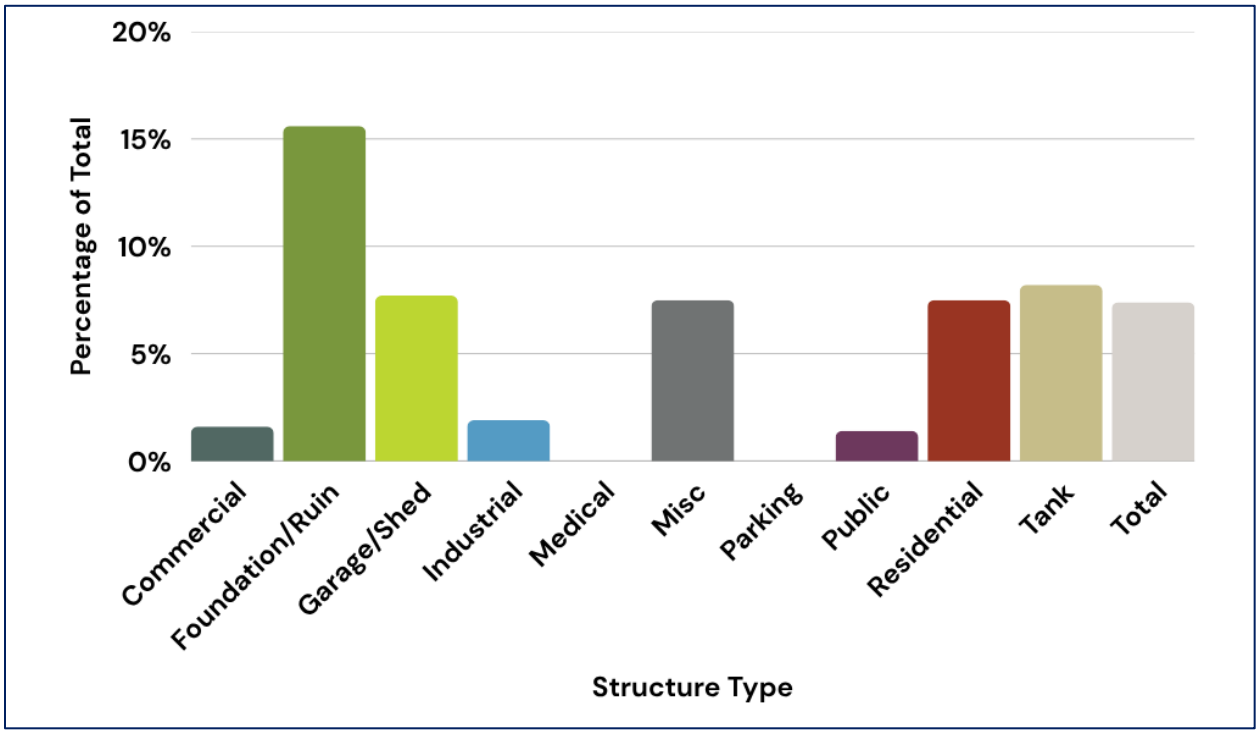
a building, heat, smoke, and airborne embers can ignite materials, degrade surfaces, and create safety hazards for occupants. **TABLE 33** below summarizes the number and types of structures in highest wildfire intensity areas across the county, while **FIGURE 52** illustrates the percentage distribution of structures by type. In Jefferson County, residential structures account for the greatest total number of buildings exposed, while foundation/ruin structures represent the highest percentage of exposure relative to their structure type.

Table 33 Structures in Highest Wildfire Intensity Areas

Structure Type	Structure Count	Structure Value	Improved Value
Commercial	129	$125,400,624	$77,546,727
Foundation/Ruin	73	$65,237,994	$42,523,394
Garage/Shed	10,507	$1,572,723,699	$872,456,359
Industrial	22	$33,802,736	$23,985,140
Medical	0	$0	$0
Misc	454	$52,768,609	$22,912,181
Parking Structure	0	$0	$0
Public	25	$25,450,694	$17,432,428
Residential	13,096	$11,176,725,304	$7,521,416,341
Tank	69	$29,507,881	$4,375,327
Total	**24,375**	**$13,081,617,541**	**$8,582,647,898**

Source: Jefferson County Assessor's & Business Innovation and Technology

Figure 52 Percent of Structures Exposed to High Fire Intensity Areas



4.17.6.4 Natural, Historic, and Cultural Resources

Wildfire in Jefferson County can cause serious and lasting damage to natural, historic, and cultural resources. In natural areas, intense fires can destroy plants, harm wildlife habitats, and increase erosion and sediment runoff in key watersheds, such as those that supply Denver's water. Burned soils may become unstable and less able to absorb water, raising the risk of flash floods and long-term ecosystem damage. Historic and cultural sites, including landmarks, historic buildings, and archaeological locations, are also at risk of permanent damage or total loss from flames, smoke, and heat. Additionally, erosion and debris flows after fires can cause further harm to these sites even after the fire is out. Wildfire events can also greatly disrupt recreation in Jefferson County by damaging forested trails, campgrounds, and scenic areas, which reduces access and diminishes the outdoor experience. They harm rivers and watersheds by increasing erosion and sedimentation, affecting water clarity, fish habitats, and activities like fishing, paddling, and riverside recreation.

4.17.6.5 Local Vulnerability

Wildfires pose a risk to all infrastructure in the Wildland-Urban Interface, which continues to expand across the county. Water resources and quality are at risk

from post-wildfire debris flows, and resident displacement due to wildfires is also a significant concern.

4.17.7 Probability of Future Occurrences

Wildfires are likely to happen every year in Jefferson County based on past patterns and local climate conditions. According to the 2024 CWPP and 2022 Colorado Wildfire Risk Assessment, over half of the county is in the high to highest burn probability categories. The highest probabilities are in the northern part of the county, where steep, vegetated terrain can promote rapid fire spread. The 2024 CWPP also points out the Rocky Flats National Wildlife Refuge as an area with increased burn chances, along with steep slopes and complex terrain between Sheep Mountain and the Town of Phillipsburg in the southeastern part of the county. The Planning Team also mentioned that invasive species, such as the emerald ash borer, will lead to more dead trees, further increasing the risk of wildfire. Overall, the possibility of future wildfires in the county is considered highly likely.

4.17.8 Climate Change Impacts

Climate change is increasing wildfire risk in Jefferson County by creating hotter, drier, and windier conditions. These changes extend the fire season, dry out vegetation, and raise the chances of large, fast-moving fires. Since 1900, Colorado's average temperatures have risen by about 2°F, leading to earlier snowmelt, decreased soil moisture, and more frequent droughts, factors that make forests and grasslands more fire prone. The Jefferson County Climate Action Plan highlights that four of Colorado’s five largest wildfires occurred between 2018 and 2020, showing how quickly fire severity is worsening. The 2024 CWPP highlights that these changing conditions endanger air quality, watersheds, infrastructure, and resident safety in the wildland–urban interface.

4.18 Cyber Attack

4.18.1 General Background

Cyber attacks are deliberate exploits targeting computer systems, technology-dependent businesses, and networks. These attacks employ malicious code to alter computer functions or data. As reliance on networked technologies grows among individuals and organizations, the vulnerability of computer systems to such threats increases. The FBI states that "cyber intrusions are becoming more commonplace,

more dangerous, and more sophisticated," affecting both private and public sector networks. Cyber threats encompass various 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.

4.18.2 Past Events

The Privacy Rights Clearinghouse, a nonprofit organization based in San Diego, California, maintains a timeline of over 75,000 data breaches resulting from computer hacking incidents in the United States from 2005 to November 2025. The

database lists 503 data breaches against systems located in Colorado, 20 of which impacted local governments. Attacks happening outside of the state can also impact local businesses, personal identifiable information, and credit card information. **TABLE 34** shows several of the more significant cyber attacks on local governments in Colorado in recent years.

Table 34 Cyber Attacks Impacting Local Governments in Colorado, 2005-November 2025

Breach Date	Reported Date	Type	# of Individuals Affected	Organization	Location
Unknown	July 8, 2010	Stationary Computer	105,470	Governor's Office of Information Technology	Denver
Unknown	June 28, 2011	Portable Device	3,589	U.S. Department of Health and Human Services	Colorado
October 31, 2017	December 26, 2017	Hacking/IT Incident	639	Colorado Department of Health and Human Services	Pueblo
Unknown	February 2018	Data encryption/ ransomware	Unknown	Colorado Department of Transportation	Denver
Unknown	February 2019	Ransomware	Unknown	Fort Collins Loveland Water District	Fort Collins
Unknown	Fall 2019	Hacking/IT Incident	Unknown	Town of Erie	Erie
June 5, 2019	June 8, 2019	Unintended Disclosure	1	City of Longmont	Longmont
Unknown	November 2019	Ransomware	Unknown	Archuleta County	Pagosa Springs
July 31, 2019	December 26, 2019	Hacking/IT Incident	2	Aurora Water Department	Aurora

Breach Date	Reported Date	Type	# of Individuals Affected	Organization	Location
August 29, 2019	December 29, 2019	Hacking/IT Incident	1	Aurora Water Department	Aurora
Unknown	July 2020	Ransomware	Unknown	City of Lafayette	Lafayette
Unknown	January 18, 2022	Hacking/IT Incident	5	Colorado Department of Higher Education	Denver
August 12, 2022	October 4, 2022	Hacking/IT Incident	1	Fremont County	Canon City
August 28, 2022	October 4, 2022	Hacking/IT Incident	2	City of Wheat Ridge	Wheat Ridge
August 28, 2022	September 27, 2022	Hacking/IT Incident	3	City of Wheat Ridge	Wheat Ridge
January 19, 2023	March 22, 2023	Hacking/IT Incident	Unknown	Upper Thompson Sanitation District	Estes Park
May 27, 2023	February 19, 2024	Hacking/IT Incident	410	Colorado Department of Health Care Policy & Financing	Denver
May 27, 2023	August 10, 2023	Hacking/IT Incident	4,091,794	Colorado Department of Health Care Policy & Financing	Denver
June 10, 2023	February 14, 2024	Hacking/IT Incident	1,205,048	Colorado Department of Higher Education	Denver
Unknown	February 21, 2024	Unknown	49,905	Colorado Department of Health Care Policy & Financing	Denver

Source: Privacy Rights Clearinghouse

4.18.3 Location

Cyber attacks can occur anywhere, regardless of location, demographics, or security measures. Such incidents may impact a single site or multiple areas. Disruptions can have far-reaching effects beyond the immediate target; events outside the state can still influence residents, businesses, and organizations in the county. Every populated area in Jefferson County faces the potential threat of cyber attacks.

4.18.4 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 smaller, 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.

4.18.5 Secondary Hazards

Secondary hazards from cyber attacks can appear in many ways, extending beyond the initial disruption of digital systems. For example, cyber incidents targeting critical infrastructure may indirectly lead to physical dangers, such as power outages that affect essential services or hinder emergency response efforts. These outages can create hazardous conditions, endanger public safety, and trigger

cascading failures in other interconnected systems. Additionally, the theft or alteration of sensitive data can cause reputational damage, financial losses, and regulatory sanctions for organizations, further amplifying the overall severity and consequences of the original cyber event.

4.18.6 Exposure and Vulnerability

4.18.6.1 Lifelines

A cyber attack on Jefferson County could cause cascading effects across all community systems. Safety and security services, including law enforcement, 911 dispatch, and emergency management, might face disruptions, complicating coordinated responses during multiple incidents. Energy and communication infrastructures are particularly at risk; a significant cyber breach could disable SCADA systems, affecting power, water, and wastewater services, and disrupting communication networks relied on by public safety, healthcare, and local government. Transport and government operations could also be compromised by ransomware or data loss, affecting traffic control, fueling stations, and service delivery, which may cause public confusion and delays in essential functions. The healthcare sector might encounter problems with hospital networks, patient records, or pharmaceutical supply chains, impacting ongoing medical care. Financial systems could face interruptions in online transactions, payroll, and public assistance programs, affecting residents and businesses alike.

4.18.6.2 People

Most cyber attacks typically do not result in injuries or deaths. Their main effects on the public often involve financial losses and difficulty accessing systems like public websites and permit offices. Indirect consequences may include disruptions to traffic management and other infrastructure, which can sometimes lead to casualties. More serious threats include ransomware attacks on hospitals or 911 systems, which could endanger lives. Data breaches and resulting identity thefts can also have serious public impacts. The Internet Crime Complaint Center (IC3) estimates that in 2024, cyber threats caused $1.6 billion in damages. The Cyber and Infrastructure Security Agency (CISA) reports that 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 data misuse and recovery.” Recent attacks on 9-1-1 systems noted by CISA include a DDoS attack in Arizona, unauthorized access

with stolen credentials in Canada, a network outage in New York, and a ransomware incident in Baltimore.

4.18.6.3 Structures

Most cyber attacks primarily target data and computer systems, causing minimal property damage. Nonetheless, sophisticated assaults on utilities and infrastructure have been reported. These often focus on Supervisory Control and Data Acquisition (SCADA) systems used in critical infrastructure, which can result in failures similar to natural disasters. For instance, in Ukraine in 2015, a cyber attack disrupted the power grid, leaving over 230,000 people without electricity. Agencies relying on electronic backups of critical files are particularly vulnerable. Service delivery is also impacted, as governments depend heavily on digital tools. Many use server backups, electronic archives, and remote solutions for Continuity of Operations/Continuity of Government. Some jurisdictions can temporarily revert to paper procedures for tasks like permitting, DMV services, payments, and payroll. However, access to digital documents, online document platforms, and other collaborative platforms across the county will be significantly impeded. A cyber attack that disables government servers could hinder responders' ability to perform key functions, disrupting emergency communication, mobile data terminals, and access to essential preplans and response documents. Overall, dependence on electronic government systems raises concerns about security and resilience to cyber threats.

4.18.6.4 Natural, Historic, and Cultural Resources

Most cyber incidents rarely affect historic, cultural, or natural resources. However, a significant cyber terrorism attack could pose environmental risks by releasing hazardous materials or causing accidents involving dangerous substances due to disrupted traffic-control systems.

4.18.6.5 Local Vulnerability

The greatest concern from cyberattacks in Jefferson County is the potential disruption of communications, unauthorized access or leakage of sensitive information, and the freezing or loss of critical data.

4.18.7 Probability of Future Occurrences

There is a likelihood of annual future cyber attacks in Jefferson County, and there is an anticipation of an increase as reliance on interconnected digital systems grows

across various sectors. As local governments, utilities, and essential services increasingly adopt technologies like SCADA systems, electronic records, and smart infrastructure for greater efficiency and resilience, the number of potential cyber entry points also expands. Recent reports from agencies such as CISA and IC3 highlight an ongoing and evolving threat environment.

4.18.8 Climate Change Impacts

Although climate change does not directly cause cyber attacks, it can make Jefferson County more vulnerable by stressing and tying together critical systems dependent on digital infrastructure. Cyber threats are growing, and the CO E-SHMP highlights that as communities enhance infrastructure—such as smart grids, water systems, and emergency communication networks—to address climate-related events, these systems also become more vulnerable to cyber risks. Extreme weather events like heat waves, wildfires, and floods can damage power supplies and data centers, offering malicious actors opportunities to exploit weakened systems or cause cascading failures. Additionally, the rising need for remote access, data sharing, and online emergency coordination increases potential cyber entry points.

4.19 Pandemic

4.19.1 General Background

Pandemics can strain healthcare systems, disrupt economies, and result in loss of life on a global scale, as was seen during the COVID-19 pandemic. Zoonotic diseases, which are transmitted between animals and humans, may increase as land-use changes and climate alterations lead to more human-wildlife interactions. These hazards demonstrate the interconnectedness of environmental health and human survival, underscoring the need for proactive measures to monitor, prevent, and mitigate their consequences.

4.19.2 Past Events

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.
- **2020-2023 COVID-19:** The COVID-19, or novel coronavirus pandemic, began in December 2019 and was declared a pandemic in March 2020. The World Health Organization declared an end to the public health emergency in May 2023, although COVID-19 continues to circulate among the global population.

4.19.3 Location

The entire county is susceptible to the impacts of a pandemic event.

4.19.4 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 one to two 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. Still, it 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 example, 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.

4.19.5 Secondary Hazards

Secondary hazards related to a pandemic go beyond the direct health effects of the disease itself. These hazards can include disruptions to vital services such as healthcare, transportation, and supply chains, leading to shortages of food, medicine, and other essential resources. Moreover, increased absenteeism in the workforce may impair the operation of utilities, emergency services, and public safety efforts. Social and psychological stresses can intensify due to prolonged isolation, economic instability, and uncertainty, which may lead to a rise in mental health problems and social unrest. Additionally, overlapping emergencies, like natural disasters during a pandemic, can hinder response efforts and worsen existing vulnerabilities within communities.

4.19.6 Exposure and Vulnerability

4.19.6.1 Lifelines

During a pandemic, lifelines in Jefferson County including healthcare, transportation, and supply chains can be significantly disrupted. This disruption may lead to shortages of critical resources such as food and medicine and hinder the delivery of essential services. Increased absenteeism among workers can further impact the operation of utilities, emergency services, and public safety efforts, potentially leaving communities more vulnerable.

4.19.6.2 People

A pandemic can significantly impact people in many ways, going beyond just physical illness. Individuals may face considerable emotional and mental stress caused by isolation, uncertainty, and changes to daily routines. Economic instability and losing jobs can add more burdens on families, while increased absenteeism might harm essential services, leaving some without the support they need. Vulnerable groups, such as the elderly or those with existing health conditions, often encounter higher risks of severe illness and limited access to healthcare. Social bonds can be strained, as fear and anxiety sometimes lead to stigmatization or unrest within communities.

4.19.6.3 Structures

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.

4.19.6.4 Natural, Historic, and Cultural Resources

Impacts to these resources are typically minimal. However, reduced tourism during outbreaks could lead to additional economic impacts.

4.19.6.5 Local Vulnerability

The greatest risk in Jefferson County is to residents, particularly those with access and functional needs, who are at increased risk of adverse outcomes during pandemic events.

4.19.7 Probability of Future Occurrences

The probability of future pandemics impacting Jefferson County is expected to rise due to several converging factors. Globalization increased human mobility, and climate change increase the likelihood of infectious disease emergence and transmission. As development continues and population density increases, the risk of rapid disease spread within the community also grows. It is likely the county will be affected by a pandemic in the next 10 to 50 years.

4.19.8 Climate Change Impacts

Climate change is expected to elevate the risk of pandemics and other health emergencies in Jefferson County by influencing disease transmission and straining community health systems. The CO E-SHMP notes that rising temperatures, altered rainfall, and more frequent extreme weather events can expand the habitats and active periods of vectors like mosquitoes and ticks, increasing the likelihood of vector-borne diseases. Climate-induced migration, food and water supply disruptions, and air quality from wildfires and heat can weaken public health resilience, making communities more susceptible to illness. Extreme weather can also challenge healthcare infrastructure and supply chains, complicating outbreak management. As environmental and social conditions evolve due to climate

change, Jefferson County faces an increased risk of emerging infectious diseases and pandemics, underscoring the need for adaptable public health strategies and resilient healthcare systems.

FEMA Approval and Local Government Adoption

HMP Appendices

The following supplemental information is contained in a separate HMP Appendices document.

Appendix A – Planning Team

Appendix B – Hazus Earthquake Global Risk Report

Appendix C – Public Survey Results

Appendix D – Workshop Agendas/Attendance

HMP Annexes

Standalone HMP Annexes documents have been individually developed for each participating local government. Additionally, details pertaining to the 2026 new mitigation actions are captured in a separate digital annex spreadsheet.