PIKES PEAK REGIONAL

MULTI-HAZARD MITIGATION PLAN UPDATE 2020

Prepared by the Pikes Peak Regional Office of Emergency Management with assistance from Michael Baker International and Forsgren Associates.

EXECUTIVE SUMMARY

This plan is an update and consolidation of the 2016 Colorado Springs Multi-Hazard Mitigation Plan and the 2015 El Paso County Multi-Hazard Mitigation Plan into a combined Pikes Peak Regional Office of Emergency Management Multi-Hazard Mitigation Plan. The Plan includes unincorporated El Paso County and the jurisdictions of Colorado Springs, Calhan, Fountain, Green Mountain Falls, Manitou Springs, Monument, Palmer Lake, and Ramah.

El Paso County, as the fiscal agent for Pikes Peak Regional Office of Emergency Management (PPROEM), obtained a Pre-Disaster Mitigation Grant to find this update. The County then contracted Michael Baker International to work in coordination with PPROEM to create this regional Hazard Mitigation Plan (HMP) update.

The purpose of this HMP is to assess risk and identify actions which can help PPROEM reduce or eliminate risk for injury, loss of life, property damage, and/or property loss due to natural disasters.

The hazards impacting the Pikes Peak Region are profiled as hazard categories along with the associated hazard impacts or variations within that category. These include the natural and man-made hazards below:

Hazard Category	Hazard Impacts or Variations
Flood	Flood, Mud or Debris Flow, Dam/Levee Failure
Severe Weather	Hail, Drought & Extreme Heat, Lightning, Tornado, Wind, Winter Storm
Avalanche	Avalanche
Geologic	Earthquake, Subsidence & Sinkholes, Landfall or Rockfall
Wildfire	Wildfire
Human-caused	Hazardous Materials, Extreme Acts of Violence, Cyber Attack, Pandemic/Epidemic, Major Aircraft Incident

EXECUTIVE SUMMARY

The following guiding principles are the foundation for the mitigation strategy:

- Reduce or eliminate long-term risks to life safety and property in the Pikes Peak Region from natural and human-caused hazards, incidents/events.
- Sustain successful measures that reduce exposure to future disaster losses and implement other measures that strengthen the disaster preparedness of the community.
- Institute pro-active comprehensive preparedness and mitigation programs involving government entities, in partnership with other agencies, other partners, and the public to reduce the effects of a disaster as well as reduce the time and resources required for response and recovery.

By maintaining a current plan, jurisdictions ensure they remain eligible for grant funds that contribute to mitigation projects and are able receive post-disaster assistance should a major natural disaster occur. PPROEM will use this plan to guide and assist community decision makers as they further refine and implement mitigation strategies and actions across the region.

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Chapter 1 | Introduction

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Chapter 1 | Introduction

This chapter provides information on the purpose and participating jurisdictions in the Pikes Peak Regional Office of Emergency Management Multi-Hazard Mitigation Plan (HMP or Plan), describes federal hazard mitigation planning requirements and grant programs, lists an outline of the Plan's organization, and describes updates.

1.1 BACKGROUND AND PURPOSE

The Pikes Peak Regional Office of Emergency Management (PPROEM) prepared this multi-jurisdictional HMP to better protect the people and property within the region from the impacts of natural and human-caused hazard events. Prior to this Plan update process, the City and County consolidated their Offices of Emergency Management in an effort to optimize staff resources, establish a single point of contact during major incidents and enhance communication both during and after an event. The new office, the Pikes Peak Regional Office of Emergency Management, was established in January 2019 to manage all hazard planning and response to emergencies and disasters occurring within El Paso County and the City of Colorado Springs. Because disaster knows no jurisdictional boundaries, the establishment of the PPROEM allows the County and the City to more effectively prepare for an emergency and respond to one by coordinating efforts on a regional basis.

Past disasters within and around the Pikes Peak region have caused loss of life, damaged buildings and infrastructure, and have impacted local communities' economic, social, and environmental well-being. Mitigation, as defined by FEMA, is any sustained action(s) taken to reduce or eliminate risk to life and property due to a disaster (44 CFR § 201.2 Mitigation Planning-Definitions). Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process results in the hazard mitigation plan, which identifies specific mitigation actions that are designed to achieve both short term planning objectives and long-term community vision. To ensure the functionality of each mitigation action, responsibility is assigned to a specific individual, department, or agency along with a schedule for its implementation. Plan maintenance procedures are then established to help implement, evaluate, and enhance the Plan as necessary. Developing clear plan maintenance procedures ensures that this Hazard Mitigation Plan remains a current, dynamic, and effective planning document over time.

Hazard mitigation assumes that the identified pre-disaster actions will significantly reduce the necessity for emergency response, repair, and recovery, thus also decreasing the demand for post-disaster assistance. Other benefits of implementing hazard mitigation actions include:

- Protection of lives and property;
- Safeguarding economic health, including public and private investments;
- Ability to quickly and effectively recover post-disaster;

- Reduction of future vulnerability through wise development and post-disaster recovery and reconstruction;
- The enhancement of coordination within and across participating jurisdictions;
- Enabling and expediting the receipt of pre-disaster and post-disaster grant funding; and
- Allowing the jurisdictions to integrate hazard mitigation planning across all levels of government and planning.

This Plan is the result of continuing work by the citizens and stakeholders of El Paso County and Pikes Peak Region to update a regional multi-hazard mitigation plan that will not only continue to guide these communities towards greater disaster resistance, but also respect the character and needs of local jurisdictions and their residents.

Keeping plans current is an essential part of working toward and maintaining resilience for communities. To be eligible for FEMA's pre-disaster mitigation funds, communities must have a current plan that has been approved by both the state and FEMA. To remain current and maintain eligibility, all HMPs must be updated every five years. This Pikes Peak Regional HMP supports El Paso County and the participating jurisdictions as they better prepare for future disasters and allows them to be eligible for certain disaster-related federal funding opportunities. The communities throughout the Pikes Peak Region will use this Plan as a tool to support and guide as they continue to implement mitigation actions.

Several factors initiated this planning effort:

- The Pikes Peak region is exposed to hazards that have caused extensive past damage.
- Limited local resources make it difficult to be pre-emptive in reducing risk. Eligibility for federal financial assistance is paramount to successful hazard mitigation in the area.
- El Paso County and its partners participating in this plan want to be proactive in preparing for the probable impacts of natural hazards.
- Federal Emergency Management Agency (FEMA) approval of the 2015 *El Paso County Multi-Jurisdictional Hazard Mitigation Plan* and *2016 City of Colorado Springs Hazard Mitigation Plan* expires on September 3, 2020 and May 4, 2021, respectively. A current, FEMA-approved hazard mitigation plan is necessary for the County to obtain post-disaster mitigation funding after a disaster declaration. This updated hazard mitigation plan is a multi-jurisdictional plan that represents not only the unincorporated County, but also the specific concerns of participating incorporated municipalities.
- This updated plan recognizes the creation of the Pikes Peak Office of Emergency Management, which support operations during a disaster of emergency in El Paso County and the City of Colorado Springs.

1.2 MITIGATION PLANNING REQUIREMENTS

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) required state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. Prior

to 2000, federal disaster funding focused on disaster relief and recovery, with limited funding for hazard mitigation planning. The DMA increased the emphasis on planning for disasters before they occur.

The planning requirements for local entities are identified in their appropriate sections throughout this Plan. FEMA's October 31, 2007 changes to 44 CFR Part 201 combined and expanded flood mitigation planning requirements with local mitigation plans (44 CFR §201.6). It also required participating National Flood Insurance Program (NFIP) communities' risk assessments and mitigation strategies to identify and address properties repetitively damaged by flood. Appendix A includes a completed FEMA plan review tool, which is an official report card used by FEMA reviewers for local hazard mitigation plans documenting compliance with 44 CFR§201.6.

Community Rating System (CRS)

In addition to FEMA requirements, the PPROEM communities and the county also participate in the CRS program. Specific information on community classes and activities are included later in this document. The last verification was in 2019.

Emergency Management Accreditation Program (EMAP)

In addition to FEMA requirements, PPROEM also maintains certification through the EMAP by complying with the updated 2019 Emergency Management Standards set forth by the EMAP program. The following EMAP Standards are addressed through this Plan:

- **4.1** Hazard Identification, Risk Assessment and Consequence Analysis
- **4.2** Hazard Mitigation

Specific requirements for these EMAP Standards are identified in Chapter 4. Hazard Identification and Risk Assessment, Chapter 5. Mitigation Strategy, and Chapter 6. Plan Maintenance and Implementation.

1.3 GRANT PROGRAMS REQUIRING HAZARD MITIGATION PLANS

Table 1-1 outlines potential funding sources available to local jurisdictions with a FEMA-approved HMP.

Table 1-1: Mitigation Plan Requirement for Governments Applying for Certain FEMA Grants

Enabling Legislation	FEMA Assistance Program	Is a Mitigation Plan Required?	
		State Applicant	Local Sub-applicant
Stafford Act	Individual Assistance (IA)	No	No
	Public Assistance (PA) Categories A and B (e.g., debris removal, emergency protective measures)	No	No
	Public Assistance (PA) Categories C through G (e.g., repairs to damaged infrastructure, publicly- owned buildings)	Yes	No
	Fire Mitigation Assistance Grants (FMAG)	Yes	No
	Hazard Mitigation Grant Program (HMGP)planning grant	Yes	No

	Hazard Mitigation Grant Program (HMGP) project grant	Yes	Yes
	Building Resilient Infrastructure and Communities (BRIC)	Yes	Yes
National Flood Insurance Act	Flood Mitigation Assistance (FMA) planning grant	Yes	No
	Flood Mitigation Assistance (FMA) project grant	Yes	Yes

1.4 ELEMENTS OF THIS PLAN

This plan includes all federally required elements of a disaster mitigation plan and is organized as follows:

- **Chapter 1: Introduction** describes the plan's purpose, the hazard mitigation planning requirements, and the plan update process.
- **Chapter 2: Planning Process** describes the planning process used to develop this Plan, including how it was prepared, who participated in the process, and how the public was involved.
- **Chapter 3: Pikes Peak Region Profile** provides a general description of the Pikes Peak Region, including its location, geography, climate, history, population, economy, critical facilities, and government and includes a capability assessment of the existing plans, programs, and policies related to each jurisdiction.
- **Chapter 4: Hazard Identification and Risk Assessment** identifies and profiles the hazards that could affect the planning area and assesses jurisdiction specific vulnerability to those hazards.
- **Chapter 5: Mitigation Strategy** provides a mitigation strategy that identifies goals and actions to mitigate hazards in the region based on the results of the risk assessment.
- **Chapter 6: Plan Implementation and Maintenance** provides a formal process for implementing, monitoring, evaluating, and updating the Plan; discusses how to incorporate the plan into existing planning mechanisms; and offers plans for continued public engagement.
- **Chapter 7: Appendices**
  - **Appendix A: Plan Review Tool** includes a completed FEMA Local Mitigation Plan Review Tool documenting compliance with 44 CFR§201.6.
  - **Appendix B: Planning Process Documentation** compiles sign-in sheets, presentations, website announcements, survey results, and other material documenting the planning process.
  - **Appendix C: Plan Maintenance Forms** provides a mitigation action progress reporting form and annual plan review questionnaire to assist in evaluating and maintaining the Plan as described in Chapter 6: Plan Implementation and Maintenance.
  - **Appendix D: Completed and Removed Actions** includes a summary of the mitigation actions completed prior to this Plan update or that have been removed from the Plan.

- **Appendix E: Plan Adoption Resolutions** includes all municipal resolutions of adoption for the plan.
- **Appendix F: References** provides references for information sources cited in the Plan.

1.5 THE UPDATED PLAN – WHAT IS DIFFERENT?

Title 44 of the Code of Federal Regulations (44 CFR) stipulates that hazard mitigation plans must present a schedule for monitoring, evaluating, and updating the plan. This provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. A jurisdiction covered by a plan that has expired is not able to pursue elements of federal funding under the Robert T. Stafford Act for which a current hazard mitigation plan is a prerequisite.

El Paso County and six of its municipalities – Calhan, Fountain, Green Mountain Falls, Manitou Springs, Monument, Palmer Lake, and Ramah - prepared the El Paso County Multi-Jurisdictional Mitigation Plan in 2015. The City of Colorado Springs also had an independently prepared plan prior to this update. This plan will merge those efforts and create a combined plan under the newly formed Pikes Peak Regional Office of Emergency Management and consolidate the unincorporated El Paso County and its seven incorporated municipalities, including the City of Colorado Springs, into one plan. This plan does not represent a standard plan update, though it does build off of prior efforts by both El Paso County and Colorado Springs. However, in order to merge the two entities processes together we developed a new set of hazards, new risk analysis methodology, new priorities, goals and objectives and a new mitigation strategy that best represents the new regional entity. It is also represented in the increased collaboration between Colorado Springs and El Paso County throughout this process.

Chapter 2 | Planning Process

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Chapter 2 | Planning Process

Plan Requirements

FEMA Requirements

Requirement §201.6(c)(1): The plan shall document the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process, include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private a non-profit interests to be involved in the planning process; and (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

EMAP Standards (2019)

4.2.1 The Emergency Management Program has a plan to implement mitigation projects and sets priorities based upon loss reduction. The plan: 1) is based on the natural and human-caused hazards identified in Standard 4.1.1 and the risk and consequences of those hazards; (2) is developed through formal planning processes involving Emergency Management Program stakeholders; and (3) establishes short and long-term strategies, actions, goals, and objectives.

This chapter describes the planning process used to develop the 2020 Plan, including how it was prepared, who participated in the process, and how the public was involved.

2.1 MULTI-JURISDICTIONAL PARTICIPATION

The Pikes Peak Office Regional Office of Emergency Management opened this planning effort to all eligible local governments in the County. The jurisdictions covered under this Plan and the person who represented each jurisdiction is provided in Table 2-1.

Table 2-1: Multi-Jurisdictional Participation Summary

Jurisdiction Name	Jurisdiction Contact	Title and Agency
Town of Calhan	Cindy Tompkins	Town Clerk, Calhan and Ramah
City of Colorado Springs	Michael Schaub	Recovery & Mitigation Planner, PPROEM
El Paso County (Unincorporated)	Lauren McCoy	Emergency Preparedness Planner, PPROEM
City of Fountain	Luchia Tingley	Emergency Manager, Fountain
Town of Green Mountain Falls	Angie Sprang	Town Manager, Green Mountain Falls
City of Manitou Springs	Karen Berchtold	Senior Planner, Manitou Springs
Town of Monument	Erica Romero	Recovery Manager, Monument
Town of Palmer Lake	Bob Radosevich	Interim Town Manager, Palmer Lake
Town of Ramah	Cindy Tompkins	Town Clerk, Calhan and Ramah

2.2 PLANNING PROCESS

The LPC used FEMA's planning process integrating recommendations from FEMA's *Local Mitigation Planning Handbook* (2013), the Local Mitigation Plan Review Tool, and the 10-step planning process used for FEMA's CRS program. Table 2-2 shows how the modified 10-step process corresponds with the planning requirements of the Disaster Mitigation Act and the elements in the Plan Review Tool.

Table 2-2: Planning Process Used to Develop the Plan

Disaster Mitigation Act Requirements 44CFR 201.6 and Local Plan Review Tool	**2013 CRS Manual Planning Steps**
Element A: Planning Process	
201.6(c)(1)	Step 1: Organize to Prepare the Plan
201.6(b)(1)	Step 2: Involve the Public
201.6(b)(2) and (3)	Step 3: Coordinate (with Other Departments and Agencies)
Element B: Hazard Identification and Risk Assessment	
201.6(c)(2)(i)	Step 4: Assess the Hazard
201.6(c)(2)(ii)	Step 5: Assess the Problem
Element C: Mitigation Strategy	
201.6(c)(3)(i)	Step 6: Set Goals
201.6(c)(3)(ii)	Step 7: Review Possible Activities
201.6(c)(3)(iii)	Step 8: Draft an Action Plan
Elements D and E: Plan Evaluation and Maintenance; and Plan Adoption	
201.6(c)(5)	Step 9: Adopt the Plan
201.6(c)(4)	Step 10: Implement, Evaluate, and Revise the Plan

This section provides a narrative description of the planning process.

Element A: Planning Process

Step 1: Organize to Prepare the Plan

PPROEM contracted with Michael Baker International (MBI) and Forsgren Associates (the Planning Team, the Team) to guide and facilitate the planning process and assemble the Multi-Jurisdictional Multi-Hazard Mitigation Plan. The plan update preparation process included: coordination of efforts with local, state, and federal agencies and organizations, specific and relevant information from multiple sources and stakeholders, and analysis and review of document drafts to help inform the overall plan update. The planning process began with a Pre-kickoff Planning Team Meeting on December 12, 2019, where the Team discussed data needs, ideas for involving the public (Step 2), and coordination with other agencies and departments (Step 3).

Local Planning Committee (LPC)

The Planning Team worked together to convene the LPC to guide the planning process and make key decisions. The LPC has membership from a broad cross-section of the community including healthcare, public works, emergency services, elected officials, neighboring jurisdictions, media, academia, and all

levels of government. The full invite list for the LPC is included in Appendix B: Planning Process Documentation. The agencies that participated in LPC meetings are listed in Table 2-3.

Table 2-3: Local Planning Committee Participants

Name	Organization	Name	Organization
Eric Barnett	SCR VOAD & Pikes Peak United Way	Virgil Hodges	Marshal, Green Mountain Falls
Tim Biolchini	COS Storm Water Enterprise	Cindy Tompkins	Town Clerk, Ramah and Calhan
Jack Ladley	COS Public Works	Robin Widmar	Pikes Peak Community College
Jessica Davis	Penrose	Troy Wiitala	EPC Public Works
Brad Dorris	Manitou Springs	Karen Berchtold	Manitou Springs
Mike Duysen	EPC IT	Josh Bartlett	CSFD
Brigitte French	Children's Hospital	Jim Reid	PPROEM
Lisa Hatfield	SCR VOAD	Thomas Buettner	UCHealth
Gary Huckabay	Red Cross	Jason Jacobson	EPC Finance
Dave Husted	COS Police Department	Bill Murphy	COS Utilities
Lonnie Inzer	PPROEM	Kim Melchior	COS Communication
Mark Johnson	Pikes Peak Community College	Jim Muth	COS Safety Specialist
Bootsy Jones	COS IT/GIS	Bret Daniels	EPC Facilities Manager
David Mejia	EPC - ADA	Todd Thomas	MVEA
Matt Reid	EPC Coroner	Stephen Leander	Pikes Peak Regional Communications Network
Jim Schanel	EPC Sheriff's Office (retired)	Kevin Junglen	EPC Sheriff's Office
Michael Schaub	PPROEM	Ryan Parsell	EPC Public Information
Kurt Schroeder	COS Parks, Recreation and Cultural Services	Erica Romero	Recovery Manager/Monument
Mark Thompson	DHSEM	Luchia Tingley	Fountain Emergency Manager
Mike McHargue	South Central Region Regional Field Manager	Kevin Madsen	PPROEM
Robert Hernandez	COS ADA	Ryan Trujillo	COS
Jennifer Vance	COS, Finance/Grants	Bob Radosevich	Interim Town Manager/Palmer Lake
Leon Kelly	EPC Coroner/Deputy Medical Director	Lauren McCoy	PPROEM
Lisa Hatfield	COSCRVOAD	Michael Archuleta	PPROEM
Dusty Dezell	COS IT	Jack Ladley	COS Public Works

To ensure participation in the plan development, the LPC members were asked to complete the following:

- Input and Guidance
    - Hazard identification and prioritization
    - Knowledge of existing needs, ongoing projects, and available resources
    - Identify potential mitigation projects/actions
    - Review and comment on draft plan
- Process support
    - Coordinate and assist with public involvement
    - Plan adoption

Figure 2-1: LPC Kickoff Meeting, February 25, 2020

At the onset of the plan process, LPC members were asked to complete a Google Form questionnaire identifying new or updated materials, including data, plans, policies, programs, studies, reports, and other technical information that support hazard mitigation or speak to hazards for review and incorporation into the planning process and risk assessment. Completed questionnaires can be viewed in Appendix B.

LPC meetings were open to the public and were held on February 25, 2020 in the Pikes Peak Regional Office of Emergency Management (see Figure 2-1) and June 22, 2020 using WebEx, a web-based meeting platform. The meetings were designed to be interactive and encouraged attendees to ask questions and provide input using a variety of different engagement strategies. Additional meeting details are provided in Table 2-4. Meeting invitations were emailed directly to LPC members and were posted to the PPROEM and project website. Following each meeting, presentations and poll results were posted to the project website.

Table 2-4: Local planning Committee Meetings

Date	Meeting Type and Agenda
02/25/2020	**LPC Kickoff Meeting** • Presented purpose and overview of mitigation planning and PPROEM Plan update. • Presented purpose and roles of the LPC. • Described Local Mitigation Planning Process including themes and concepts, list of potential hazards • Continued discussion of hazard identification and data collection process • LPC members were asked to identify the hazards that they felt posed the greatest threat to their community and/or the region, rank the types of

	mitigation activities that they felt have been most/least successful, and identify where setbacks and challenges may have been encountered during implementation of mitigation activities and what resources would help to overcome these challenges. • Results of input provided from the LPC Kickoff meeting is provided in Appendix B.
6/22/2020	**LPC HIRA Overview & Mitigation Strategy Development Meeting** • Provided an overview of risk assessment update and findings • Reviewed and modified 2015 EPC and 2016 COS goals/objectives • Discussed mitigation actions

Step 2: Involve the Public

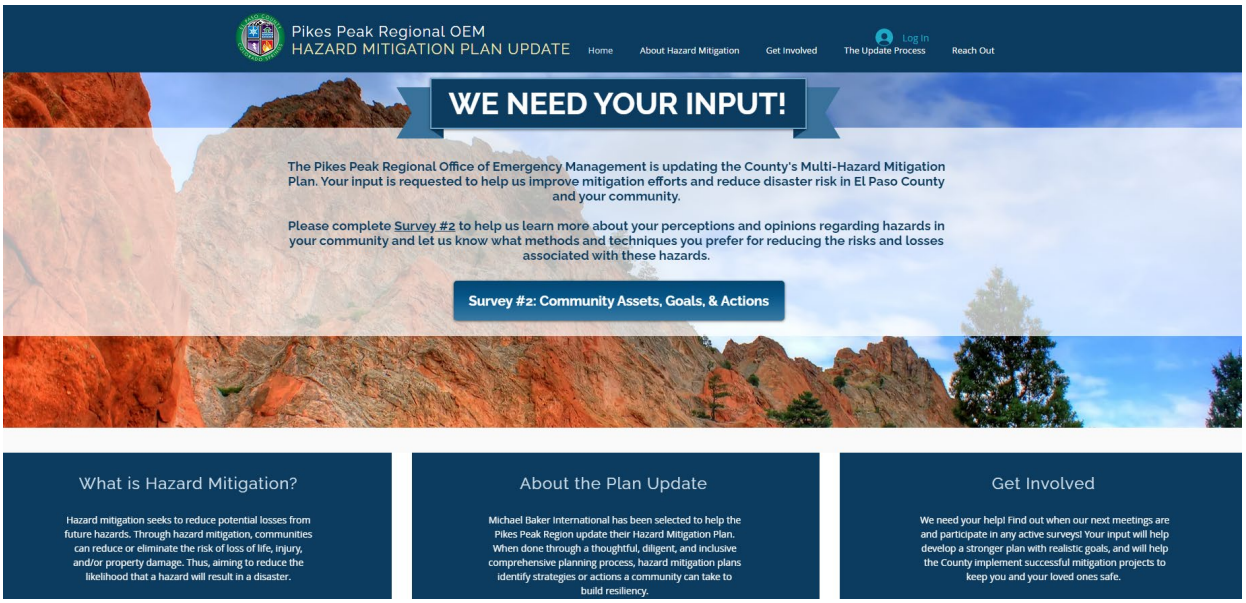
An important component of the success of this mitigation planning process involved ongoing public, stakeholder, and jurisdictional participation. Individual citizen involvement provided the Planning Team with a greater understanding of local concerns and ensured a higher degree of mitigation success by developing community "buy-in" from those directly affected by the planning decisions of public officials. An online survey was developed, which was advertised on the PPROEM and City of Colorado Springs websites, project website, a press release to *El Paso County & Fountain Valley News,* and through a listerv email blast. In addition to community members, the survey was also sent to members of the LPC. Survey results and public comments contributed to the hazard prioritization, risk assessment, and mitigation strategy portions of the Plan. See Appendix B for full public survey results and press release documentation.

Many of the LPC and stakeholders also helped publicize the Plan update process and the public input survey within their constituencies.

Project website

At the beginning of the plan development process, a project website (see Figure 2-2) was created to keep the public, stakeholders, and LPC informed of upcoming engagement opportunities, plan development milestones and to solicit input. Information was made available to the public on the site throughout the process. The project website can be accessed via this link: https://hazardmit.wixsite.com/website.

Figure 2-2: A Project Website Was Put Together to Bolster Community Engagement and Provide Process Updates



Public Review of Plan Draft: After comments by PPROEM were incorporated into a draft update of the hazard mitigation plan, it was made available for LPC, Stakeholder and general public review and comment. The Plan was distributed for public review on October 7, 2020 and a two-week public comment period followed. PPROEM publicized the availability of the draft plan by issuing press releases to over 100 media outlets both in the Colorado Springs Metro area as well as in Denver. The Plan was also available for electronic review on the PPROEM and project website. Additionally, hard copies of the Hazard Mitigation Draft Plan were hand delivered to adopting jurisdictions including Palmer Lake, Monument, Manitou Springs, Green Mountain Falls, Calhan, and Ramah. Copies of the notifications and public comments received are included in Appendix B.

Step 3: Coordinate (with Other Departments and Agencies)

PPROEM invited a range of local, state, and federal departments and agencies and other interested parties to be involved in the planning process. Table 2-2 lists many of the stakeholders who were involved in the planning process.

The team coordinated with the El Paso County Master Plan Update team, including an integration conference call to identify how the County Master Plan could incorporate hazard mitigation concepts into zoning and land use recommendations.

The team had multiple touchpoints with participating jurisdictions to identify updated or new planning efforts to inform our process and new and/or updated actions. The team incorporated input on hazard priorities and goals and updated the region profile and capabilities matrices accordingly. This input was provided during the planning team meeting, and via follow one-on-one communication.

Colorado Springs Utilities provided information on dam inundation zones over a call and El Paso County subject matter experts in Hazmat and information technology informed our assessments for these risks.

Neighboring counties, including Teller, Elbert, Pueblo, Lincoln, Fremont, and Douglas were notified and invited to participate in the planning process. Opportunities were given to provide input on community goals, assets, and actions via a digital survey and feedback was solicited from neighboring jurisdictions on the draft plan. Input received support and largely aligned with input from the participating jurisdictions.

Incorporation of Other Plans and Studies

As part of the coordination with other departments and agencies, MBI and the LPC reviewed and incorporated existing plans, studies, reports, ordinances, and technical information. This information was used in the development of the hazard identification, vulnerability assessment, and capability assessment in Chapters 3 and 4 and in the formation of goals, objectives and mitigation actions in Chapter 5. These sources are documented throughout the plan and in Appendix F: References. The plans and studies specific to the Pikes Peak region included the following:

- Hazard Mitigation Plan for Colorado Springs, 2016
- El Paso County Multi-Jurisdictional Hazard Mitigation Plan, 2015
- Colorado Springs Community Wildfire Protection Plan, 2011 (CWPP)
- Manitou Springs Community Wildfire Protection Plan, 2019 (CWPP)
- Colorado State Hazard Mitigation Plan, 2018
- El Paso County Water Master Plan 2018
- Pikes Peak Regional Building Code 2018
- El Paso Emergency Operations Hazmat 2019
- PPC Emergency Operations Plan 2017
- El Paso County Strategy Plan, 2017 – 2021
- El Paso County Master Plan
- El Paso County Land Development Code, 2018
- El Paso County Wildfire Preparedness Plan, 2020
- Emergency Operations Plan, 2020
- Plan Manitou – Community Master Plan & Hazard Mitigation Plan, 2017
- Manitou Springs Zoning and Subdivision Ordinance, 2020
- Colorado Springs Comprehensive Plan, 2019
- City of Colorado Springs Strategic plan, 2020-2024
- Pikes Peak Community College Emergency Operations Plan
- City of Colorado Springs Hazard Mitigation Strategy 2018 Annual Report
- Stormwater Infrastructure Master Plan
- Colorado Springs Preparedness Guide
- Colorado Springs Airport Master Plan
- City of Colorado Springs Utility Strategic Plan, 2019-2023
- Waldo Canyon Recovery plan (being revised in July 2015)
- Local by-laws, building codes, and zoning ordinances
- Flood Insurance Studies (amended 2018)
- City of Colorado Springs Water Shortage Ordinance, revised 2014
- City of Colorado Springs Subdivision Code
- 2014 Ignition Resistant Construction Design Guideline

- City of Colorado Springs Hillside Manual and Appendix K (Wildland Urban Interface Mitigation Requirements for the Overlay Zone)
- Pikes Peak Area Council of Governments
- El Paso County Community Services Department
- El Paso County Public Health

These plans have relative value to the PPROEM plan in that they each play a part in implementing policies, approaches, best practices, and methodologies for risk reduction to achieve common goals for the region and many other local geographies and interest groups. An assessment of the partnering jurisdictions' regulatory, technical, outreach and financial capabilities to implement hazard mitigation initiatives is presented in Chapter 3. Many of these relevant plans, studies and regulations are cited in the capability assessment.

Element B: Hazard Identification and Risk Assessment

Step 4: Identify the Hazards

At the Kickoff Meeting in February 2020 and the Risk Assessment Meeting in June 2020, MBI and PPROEM presented information on the requirements for the risk assessment section of the Plan. Topics presented and discussed in this meeting are found in Table 2-3.

Step 5: Assess the Risks

A profile of each identified hazard was created using the best available Geographic Information Systems (GIS) data, online data sources, and existing plans and reports. Members of the LPC provided information to the Planning Team about hazard data sources and past events in the region. The profiles describe overall vulnerability to each hazard and identify estimated potential losses to structures and populations in identified areas for several hazards.

Members of the LPC also provided information to help update the mitigation capability assessment, which identifies the existing government programs, policies, regulations, ordinances, and plans that mitigate or could be used to mitigate risk to disasters. This capability assessment is summarized in Chapter 3.

Element C: Mitigation Strategy

Step 6: Set Goals

At the Mitigation Strategy Meeting in June 2020, the Planning Team provided an overview of the mitigation strategy and the goals for the 2020 Plan update. Through feedback provided at this meeting, and via the public input survey, the LPC and members of the community helped to inform the goals to be included in this Plan.

Step 7: Review Possible Activities

The LPC identified and prioritized mitigation actions at the HIRA & Mitigation Strategy Meeting held on June 22, 2020 and via one-on-one communication. Details on this process are included in Chapter 5 Mitigation Strategy. Local municipalities and responsible agencies were asked to review each mitigation action and document new or updated information including ideas for implementation, alternatives, responsible offices, partners, cost estimates, benefits, and timelines for each identified action. New actions were also submitted at this time.

Step 8: Draft the Plan

MBI developed a draft of the 2020 Plan document for review by the LPC, stakeholders, and the general public. Methods for inviting interested parties and the public to review and comment on the plan were discussed in Steps 2 and 3, and materials are provided in Appendix B. Comments were integrated into a final draft for submittal to the Colorado Division of Homeland Security and Emergency Management (DHSEM) and FEMA Region VIII.

Elements D and E: Plan Review, Evaluation and Implementation, and Plan Adoption

Step 9: Adopt the Plan

Copies of the resolutions of adoption are included in Appendix E.

Step 10: Implement, Evaluate, and Revise the Plan

PPROEM developed and agreed on a method and schedule for plan implementation and for monitoring, evaluating, and maintaining the plan over time. This information is described in Chapter 6, Plan Maintenance and Implementation.

Chapter 3 | Pikes Peak Region Profile & Capability Assessment

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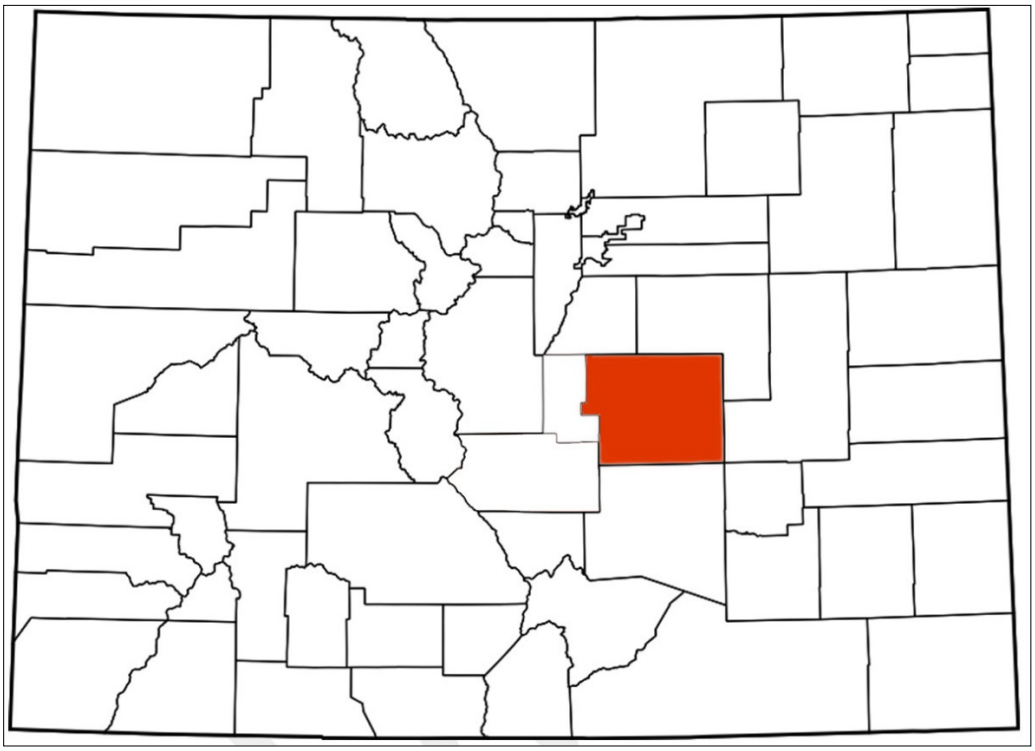
Chapter 3 | Region Profile & Capability Assessment

This chapter provides a general description of the Pikes Peak Region, including its location, geography, climate, history, population, economy, critical facilities, and governments. It also contains a capability assessment outlining the existing financial resources, programs, policies, and plans that mitigate or could be used to mitigate risk of natural hazards.

3.1 PIKES PEAK REGION PROFILE

A new, collaborative emergency management office oversees efforts across the Pikes Peak Region that includes both unincorporated El Paso County and the City of Colorado Springs. For this Plan, the planning area includes Unincorporated El Paso County and all incorporated jurisdictions within the County. El Paso County is approximately 50 miles south of Denver and includes portions of the Rocky Mountains as well as the eastern plains (see Figure 31). The County is the second most populous in the state, just behind Denver County, and covers an area of 2,126 square miles that includes mountainous terrain in the western portion and prairie or plains in the eastern portion. The elevation of the County varies from the top of Pikes Peak (14,115 feet) to Black Squirrel Creek on the southern county line at 5,095 feet. Most of the county land area is unincorporated.

Figure 3-1: Location of the El Paso County Planning Area within the State of Colorado



El Paso County consists of mainly urban areas along the Interstate 25 corridor but consists of mostly rural areas elsewhere. The largest city in the County is Colorado Springs (the second largest city in the state) at an elevation of 6,035 feet above sea level. Colorado Springs has an estimated population of 478,000, about 66 percent of the total county population of approximately 720,000 (2019 State of Colorado estimates). Other municipalities in the county are the cities of Fountain and Manitou Springs and the towns of Calhan, Green Mountain Falls, Monument, Palmer Lake, and Ramah. The County's major north-south transportation routes are Interstate 25 and a major BNSF Railway line.

Unincorporated population centers in the county include Black Forest to the north, Security and Widefield to the south, Cascade and Chipita Park to the west, and Peyton, Falcon, and Ellicott to the east. There are also five military installations: Schriever Air Force Base, Peterson Air Force Base, Fort Carson, Cheyenne Mountain Air Station, and the U.S. Air Force Academy.

3.1.1 HISTORICAL OVERVIEW

El Paso County's initial growth was driven by a search for gold during the period 1858 - 1917. The national build-up during World War II resulted in the establishment of Fort Carson on 137,000 acres to the south of Colorado Springs, and the region's military presence grew in the 1950s with the opening of the U.S. Air Force Academy. In September 1957, the US and Canada formally agreed to create the bi-national North American Aerospace Defense Command within Cheyenne Mountain. Over the next 35 years, Peterson Air Force Base, Cheyenne Mountain Air Force Station, and Schriever Air Force Base were established within the County.

The 1985 establishment of the United States Space Command at Peterson Air Force Base soon resulted in development and rapid growth of a commercial space industry. With this industry came a large influx of people and businesses into El Paso County specifically aimed at the government's Space industry. In 1986, the Space Shuttle Challenger exploded during the initial launch phase with the subsequent ceasing of space launches for several years. This created a severe impact on the economy of El Paso County with a large number of businesses closing and numerous residents defaulting on home loans. It was not until 1992 that economic recovery took hold. Today, U.S. Northern Command has replaced U.S. Space Command (moved to Omaha, NE) with an extremely large number of Homeland Security businesses opening to support this new command. With 5 military installations located in the county, the economics of the area is highly dependent on military contract jobs. Additionally, computers, electronic equipment, semiconductors, precision parts, plastics, equipment, and many other high-quality products are manufactured in the Pikes Peak region and shipped to national and international markets.

Currently, El Paso County is the second most populous of the 64 counties in the State. It is estimated that the county population was 720,403 in 2019, a 15.80 percent increase since the 2010 U.S. Census. According to the Colorado State Demography Office, El Paso County will see a 32 percent increase in population in the next 20 years. From 1992 until approximately 2004, residential and commercial property trends included extensive development in the Wildland-Urban Interface (WUI) and along the I-25 and US HWY 24 corridors. This has significantly increased the risk from wildfire and HAZMAT spills and places a significant demand on emergency planning and response resources. From 2004 until today, the majority of new residential areas are developing east of Colorado Springs as well as to the north and south.

El Paso County is a highly popular winter and summer recreation destination. It features extensive hiking and cycling trails, numerous creeks for fishing, Pikes Peak, and numerous recreational opportunities including all snow sports, mountain climbing, skating, ice fishing, hunting and, in the summer, golf, hot air balloon rides, boating, camping and more. El Paso County is home to the spectacular beauty of the Pike National Forest. Elk, moose, deer, and bighorn sheep are frequent autumn visitors on the various roads and trails.

3.1.2 MAJOR HAZARD EVENTS

Federal disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A federal disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. The planning area has experienced 15 events since 1965 for which federal disaster declarations were issued. These events are listed in Table 3-1.

Table 3-1: Past Federal Disaster Declarations In El Paso County

Disaster Declaration[a]	Description	Incident Dates
DR-200	Tornadoes, severe storms and flooding	6/19/1965
DR-261	Severe storms and flooding	5/19/1969
DR-385	Heavy rains, snowmelt and flooding	5/23/1973
DR-517	Severe storms and flash flooding	8/2/1976
DR-1276	Severe storm, flooding 4/30/99	4/29/1999 – 5/19/1999
DR-1421	Wildfires	4/23/2002 – 8/6/2002
FM-2984	Waldo Canyon fire	6/23/2012 – 7/8/2012
EM-3025	Drought	1/29/1977
EM-3185	Snow	3/17/2003 – 3/20/2003
EM-3224	Hurricane Katrina evacuation	8/29/2005 – 10/1/2005
EM-3270	Snow	12/18/2006 – 12/22/2006
EM-3365	Severe storms, flooding, landslides, and mudslides	9/11/2013 – 9/30/2013
DR-4067	High Park and Waldo Canyon wildfires	6/9/2012 – 7/11/2012
DR-4134	Black Forest wildfire	6/11/2013 – 6/21/2013
DR-4145	Severe storms, flooding, landslides, and mudslides	9/11/2013 – 9/30/2013
DR-4229	Severe storms, flooding, landslides, and mudslides	5/04/2015 – 6/16/2015
EM-3436	Colorado Covid-19	3/12/2020 -
DR-4498	Colorado Covid-19 Pandemic	3/27/2020 -

a. Federal disaster declarations are coded as follows: DR = Major Disaster Declaration; EM = Emergency Declaration; FM = Fire Management Assistance; FS = Fire Suppression Authorization

Source: FEMA Disaster Declarations Summary - Open Government Dataset (Http://Www.Fema.Gov/Disasters/State-Tribal-Government/0/Co)

Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future. Still, many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern.

3.1.3 CLIMATE

Severe weather is commonplace in El Paso County: major thunder/lightning/hailstorms resulting in extreme wildfires, extensive property damage, and flash flooding; frequent snowstorms with drifts and snowfall blocking transportation routes; and volatile tornadoes and high winds affecting the County. The County's meteorological classification is semi-arid alpine desert with approximately 250-285 days of sunshine and 15-16 inches of precipitation per year. Humidity is very low, typically in the single digits or in the teens. These conditions provide for an intense wildland fire season, yet the periodic flash floods can menace many of the creeks that have had minimal mitigation completed.

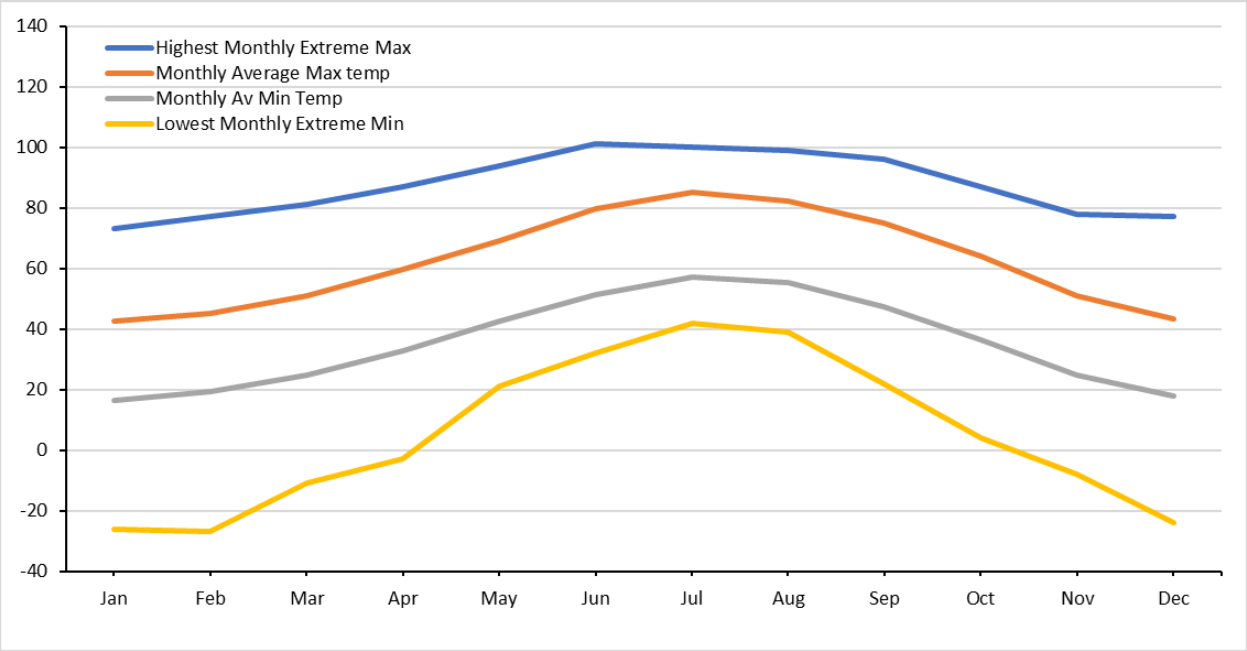
The Western Regional Climate Center reports data from the Colorado Springs Municipal Airport weather station. Table 3-2 contains temperature summaries for the station. Figure 3-2 graphs the daily temperature averages and extremes.

Table 3-2: El Paso County Temperature Summaries, Colorado Springs Station

Period of Record	1948 – 2016
Winter[a] Average Minimum Temperature	17.9°F
Winter[a] Mean Temperature	30.9ºF
Summer[a] Average Maximum Temperature	82.3°F
Summer[a] Mean Temperature	68.5ºF
Maximum Temperature	101°F; June 26, 2012
Minimum Temperature	-27°F; February 1, 1951
Average Annual # Days >90°F	18.5
Average Annual # Days <32°F/ Year	34

a. Winter: December, January, February; Summer: June, July, August
Source: Western Regional Climate Center, www.wrcc.dri.edu/

Figure 3-2: Colorado Springs Municipal Airport Station Monthly Temperature Data (4/1/1948 – 6/09/2016)



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

3.1.4 GEOLOGY AND SOILS

The geology of El Paso County varies from the plains in the eastern portion of the County to the Front Range that forms the western boundary of El Paso County. According to the Colorado Geological Survey, the plains are characterized predominantly by sedimentary rocks and the mountainous regions are comprised of a structurally complex assortment of igneous, metamorphic, and sedimentary rocks, with the igneous and metamorphic rocks predominating at higher elevations.

The most geologically significant feature of El Paso County is Pikes Peak. At 14,115 feet, it is one of Colorado's 54 “fourteeners,” mountains that rise more than 14,000 feet above mean sea level, and rises 8,000 feet above downtown Colorado Springs. Pikes Peak is a designated National Historic Landmark. Pikes Peak is composed of a characteristic pink granite called Pikes Peak granite. The color is caused by a large amount of potassium feldspar. It is thought that the granite was once magma that crystallized at least 20 miles beneath the Earth's surface. Through the process of uplifting, the hardened rock pushed through the Earth's crust and created a dome-like mountain, covered with less-resistant rock. Years of erosion and weathering removed the soil and rock leaving the exposed mountain.

3.1.5 DEMOGRAPHICS

Population directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation. Within the region’s growing population, many individuals are at greater risk from hazard events because of age, limited physical or mental capabilities, living conditions, limited access to transportation and modern technologies. Frail elders, for example, may be more likely to require

additional assistance. Research has shown that people living near or below the poverty line, the elderly (especially older single men), the disabled, women, children, ethnic minorities and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would assist the County in extending focused public outreach and education to these most vulnerable citizens.

3.1.6 POPULATION

El Paso County is the second most populous of Colorado's 64 counties. Colorado's Department of Local Affairs estimated the planning area's population at 720,403 as of 2019. Table 3-3 shows planning area population data from 1980 through 2019. The Cities of Colorado Springs and Fountain are the County's principal population centers. Colorado Springs made up 69.5 percent of the overall County population in 1980 and 66.7 percent in 2015. In 1980, 25.3 percent of the planning area's residents lived outside incorporated areas, compared to 26.7 percent in 2015.

Average annual growth of El Paso County's incorporated areas from 1980 to 2019 ranged from 0.20 percent (for the Town of Ramah) to 6.91 percent (for the Town of Monument). Unincorporated areas saw an average annual growth over that period of 2.48 percent, and the average for the entire county was 2.33 percent. Figure 3-3 shows 5-year population changes in the planning area and the State Colorado from 1980 to 2010. For that total period, Colorado's population grew by 74.7 percent (about 1.9 percent per year) while the county's population increased by 102.7 percent (2.4 percent per year).

Table 3-3: El Paso County Historical and Present Population Estimates

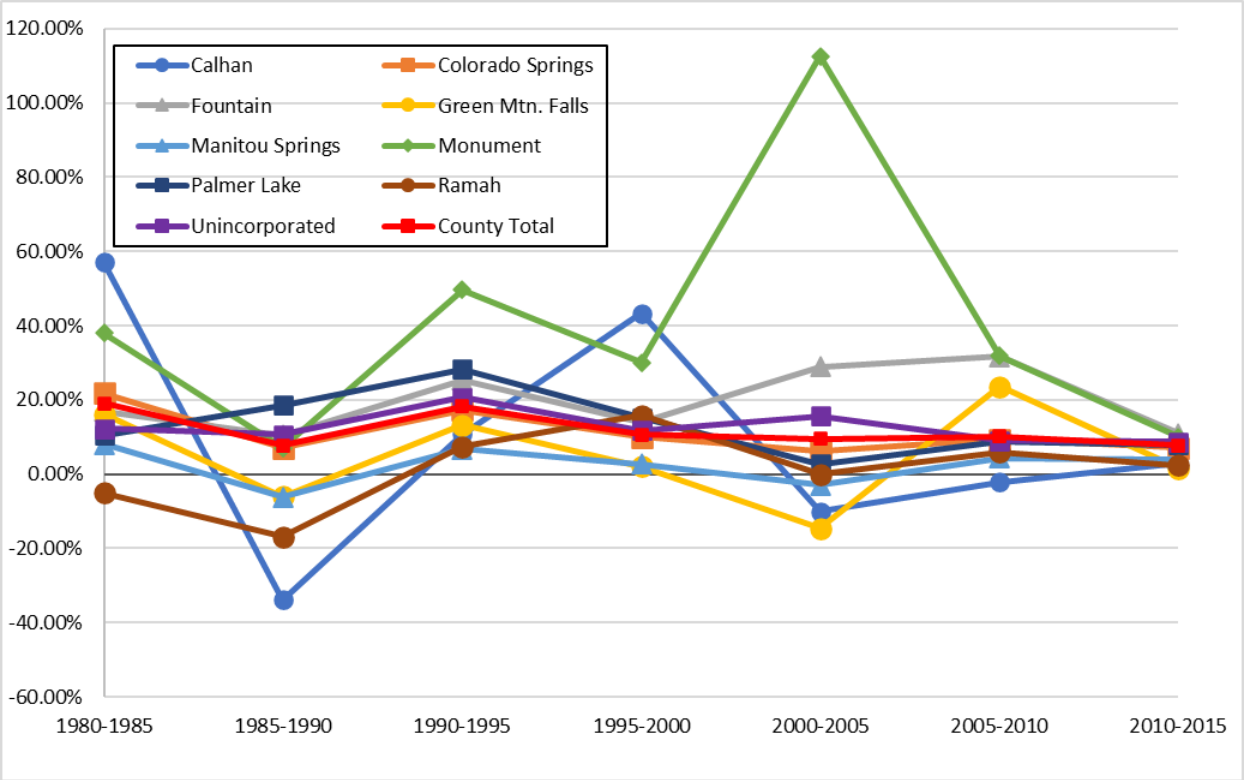
	1980	1985	1990	1995	2000	2005	2010	2015	2019
Calhan	541	850	562	623	893	803	786	809	834
Colorado Springs	215,105	262,005	280,430	328,782	361,901	384,409	420,529	450,505	478,221
Fountain	8,324	9,737	10,754	13,487	15,356	19,794	26,056	28,925	30,735
Green Mtn. Falls	607	705	663	751	766	654	808	821	722
Manitou Springs	4,475	4,834	4,535	4,843	4,971	4,826	5,034	5,238	5,390
Monument	690	952	1,020	1,527	1,987	4,225	5,572	6,125	8,097
Palmer Lake	1,130	1,248	1,480	1,898	2,185	2,245	2,440	2,633	2,993
Ramah	119	113	94	101	117	117	124	127	130

Unincorporated	78,451	88,083	97,505	117,722	131,672	152,285	165,911	180,477	191,863
County Total[a]	**309,424**	**368,506**	**397,014**	**469,693**	**519,802**	**569,322**	**627,232**	**675,663**	**720,403**

A. County population is not equal to the sum of incorporated and unincorporated areas shown in this table because the populations presented for Green Mountain Falls include the part of the town that is outside El Paso County.

Source: Colorado Department Of Local Affairs (1980 – 2019) Https://Demography.Dola.Colorado.Gov/Population/Data/Muni-Pop-Housing/
Source: Colorado Demographics, Https://Www.Colorado-Demographics.Com

Figure 3-3: State of Colorado and Planning Area Population Change



3.1.7 AGE DISTRIBUTION

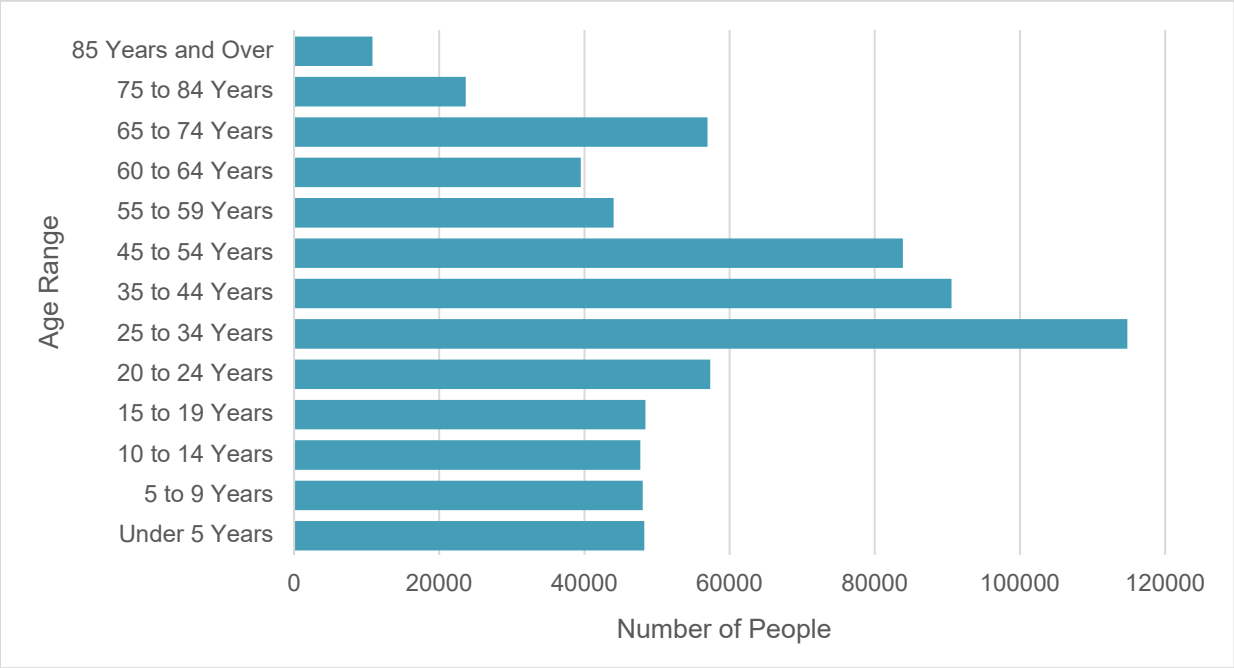
The overall age distribution for the planning area is illustrated in Figure 3-4. Based on 2018 U.S. Census data estimates, approximately 13 percent of the planning area's population is 65 or older, and approximately 32 percent of the over-65 population has disabilities of some kind. The census also estimates that 20.2 percent of the County's population is 14 or younger.

As a group, the elderly are more likely to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing, or mobility impaired, and more likely to experience mental

impairment or dementia. Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as "critical facilities" by emergency managers because they require extra notice to implement evacuation. Elderly residents living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters because of isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

Figure 3-4: El Paso County Age Distribution



3.1.8 DISABLED POPULATIONS

The 2018 U.S. Census estimates that 41 million non-institutionalized Americans with disabilities live in the U.S. People with disabilities are more likely to have difficulty responding to a hazard event than the general population. Local government is the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. It is important for emergency managers to distinguish between functional and medical needs in order to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability will allow emergency management personnel and first responders to have personnel available

who can provide services needed by those with access and functional needs. According to 2018 Census data, 12.4 percent of the population in El Paso County lives with some form of disability.

3.1.9 ETHNIC POPULATION

Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Unless well-designed and planned, post-disaster recovery efforts can be ineffective and exhibit cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poor living conditions can compound their vulnerability and heighten risk from natural disasters. According to the 2018 U.S. Census, the racial composition of the planning area is predominantly white, at approximately 80 percent (Table 3-4). The largest minority populations are African American at 6.4 percent and "two or more races" at 6.3 percent. The population also is 17.5 percent Hispanic.

Table 3-4: 2018 Race and Ethnicity Characteristics

	Race/Ethnicity (% of Total Population)							
	White	Black or African American	American Indian/ Alaska Native	Asian	Hawaiian or Pacific Islander	Other Race	More Than One Race	Hispanic or Latino (of any race)
Calhan	98.8%	0.0%	0.4%	0.2%	0.0%	0.6%	0.6%	0.5%
Colorado Springs	78.3%	6.2%	0.7%	3.0%	0.3%	5.6%	6.0%	17.7%
Fountain	73.9%	10.0%	0.7%	3.6%	3.1%	1.7%	7.1%	24.8%
Green Mountain Falls	90.0%	0.0%	0.0%	4.2%	0.0%	1.0%	4.7%	4.6%
Manitou Springs	93.7%	0.2%	0.3%	1.2%	0.7%	0.3%	4.3%	3.7%
Monument	83.2%	1.7%	0.4%	2.4%	0.0%	4.5%	7.9%	10.1%
Palmer Lake	87.4%	0.6%	5.1%	1.2%	0.0%	3.1%	2.6%	15.4%
Ramah	87.2%	0.0%	0.6%	0.0%	0.0%	0.6%	11.5%	23.7%
Unincorporated*	83.8%	4.8%	0.8%	2.3%	0.3%	1.9%	6.1%	12.6%
County Total	**79.7%**	**6.4%**	**0.8%**	**2.9%**	**0.4%**	**3.6%**	**6.3%**	**17.5%**

Source: U.S. Census Bureau, 2018, www.census.gov

**Source: U.S. Census Bureau, 2012, www.census.gov*

The planning area has a 6.9-percent foreign-born population. Other than English, the most commonly spoken language in the planning area is Spanish. The census estimates 3.7 percent of all residents speak English "less than very well."

3.1.10 ECONOMY

Select 2018 economic characteristics estimated for El Paso County by the U.S. Census Bureau are shown in Table 3-5.

3.1.11 INCOME

In the United States, individual households are expected to use private resources to prepare for, respond to, and recover from disasters to some extent. This means that households living in poverty are automatically disadvantaged when confronting hazards. Additionally, the poor typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in earthquakes, tornadoes, and floods than other types of housing. In urban areas, the poor often live in older houses and apartment complexes, which are more likely to be made of un-reinforced masonry, a building type that is particularly susceptible to damage during earthquakes. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters.

Based on U.S. Census Bureau estimates, per capita income in the planning area in 2018 was $33,536, and the median household income was $68,119. It is estimated that 17.4 percent of households receive an income between $100,000 and $149,999 per year and 13.3 percent are above $150,000 annually. People with incomes below the poverty level in 2018 made up 6.8 percent of all families and 9.9 percent of the total county population. Census estimates indicate that 10.7 percent of El Paso County families with children under 18 had incomes below the poverty line for 2018.

Table 3-5: 2018 Economic Characteristics

	% Of Families Below Poverty Level	% Of Individuals Below Poverty Level	Median Home Value	Median Household Income	Per Capita Income	% Of Population >16 In Labor Force	% Of Population >16 Employed (Civilian + Military)
Calhan	4.1	11.3	$163,800	$46,607	$18,526	58.9	52.2
Colorado Springs	9.9	13.7	$213,400	$54,351	$29,064	68.9	62.9
Fountain	9.4	10.3	$181,500	$57,015	$22,941	71.6	67.4
Green Mtn Falls	0	5.5	$195,000	$36,875	$30,370	66.6	61.0
Manitou Springs	10.8	14.6	$332,900	$49,432	$40,207	67.1	61.9
Monument	3.7	2.8	$301,900	$87,090	$31,381	70.3	65.5
Palmer Lake	4.6	7.4	$255,100	$58,000	$30,004	72.9	69.5
Ramah	0	2.8	$112,500	$63,214	$37,104	59.7	59.7
County Total	**9.1**	**12.5**	**$217,500**	**$57,531**	**$28,776**	**69.3**	**63.5**

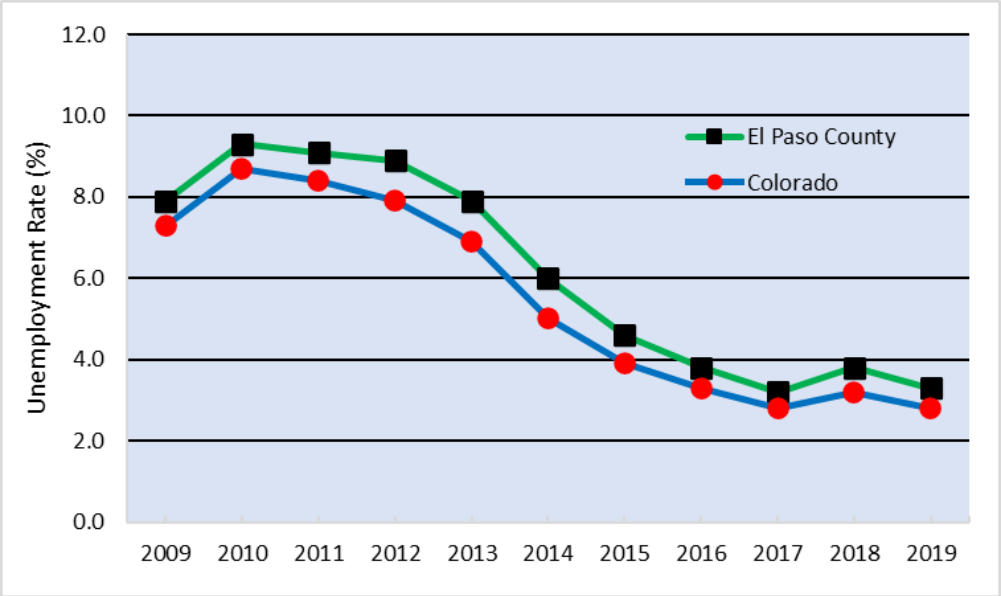
Source: U.S. Census Bureau, 2018, www.census.gov

3.1.12 EMPLOYMENT TRENDS

According to the 2018 American Community Survey, 59 percent of El Paso County's population 16 years and older is in the labor force. According to the Colorado Department of Labor and Employment, El Paso County's unemployment rate as of December 2019 was 2.8 percent, compared to a statewide rate of 2.5 percent. Figure 3-5 compares Colorado's and El Paso County's unemployment trends from 2009 through

2019, based on data from the U.S. Bureau of Labor Statistics. El Paso County's unemployment rate was lowest in 2017 at 3.2 percent and peaked in 2010 at 9.3 percent.

Figure 3-5: State of Colorado and El Paso County Unemployment Rate



Source: U.S. Bureau of Labor Statistics, 2020

3.1.13 OCCUPATIONS AND INDUSTRIES

According to U.S. Census data, the 2018 distribution of occupation types by percent of total employment in El Paso County was as follows:

- Management, business, science, and arts occupations, 41.4 percent
- Service occupations, 17.7 percent
- Sales and office occupations, 22.4 percent
- Natural resources, construction, and maintenance occupations, 9.3 percent
- Production, transportation, and material moving occupations, 9.3 percent.

According to 2018 Census data, the planning area's economy is strongly based in the education, health care and social assistance industries (20.3 percent of total employment), followed by the professional and administrative industry (13.7 percent) and retail trade (11.5 percent).

According to the Colorado Department of Labor and Employment, Peterson Air Force Base is the largest employer in El Paso County, with more than 5,000 employees. An additional 22 employers in the county have 1,000 or more employees. Almost all are in Colorado Springs. They include the following (Colorado LMI, 2019; Gateway website, https://www.colmigateway.com):

- U.S. Air Force Academy
- Atmel Corporation
- Broadmoor Hotel
- Cheyenne Mountain Air Station
- Compassion International
- Direct Checks Unlimited

- Hewlett-Packard
- Memorial Hospital
- Penrose Hospital
- Pikes Peak Community College
- Schriever Air Force Base
- Verizon Wireless

The U.S. Census estimates that 77.1 percent of El Paso County workers commute alone (by car, truck or van) to work, and mean travel time to work is 23.7 minutes.

3.1.14 FUTURE TRENDS IN DEVELOPMENT

The partnering jurisdictions have adopted comprehensive plans that govern land use decision and policy making in their jurisdictions. Decisions on land use will be governed by these programs. This plan will work together with these programs to support wise land use in the future by providing vital information on the risk associated with natural hazards in the planning area. The present land use in the planning area is shown on Table 3-6.

Partnering jurisdictions are encouraged to incorporate this Hazard Mitigation Plan Update into their comprehensive plans by reference and practice. This will ensure that future development trends can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this Plan.

Table 3-6: Present Land Use in Planning Area

Present Use Classification	Area (acres)	% of total
Agriculture	40,750	3.1
Commercial	16,475	1.2
Education	55	0.004
Government	152,994	11.5
Industrial	6,514	0.5
Religion/Non-Profit	3,313	0.2
Residential	391,202	29.4
Uncategorized	717,512	54.0
Total	**1,328,816**	**100.0**

Note: Acreage covers only mapped parcels and may exclude many rights of way and major water features.

There are an estimated 227,356 structures within the planning area. Table 3-7 shows the number of structures by jurisdiction and the number and percent of these structures that are estimated to be residential.

Table 3-7: Structures Within the Planning Area

	Total Structures		Residential Structures	
	Number	% of Total	Number	% of Total
Calhan	511	0.2	411	0.2
Colorado Springs	137,504	60.5	127,330	56
Fountain	8,677	3.8	8,154	3.6
Green Mtn. Falls	377	0.2	355	0.2
Manitou Springs	2,134	0.9	1,967	0.9
Monument	2,373	1.0	2,153	0.9
Palmer Lake	1,257	0.6	1,126	0.5
Ramah	91	0.04	81	0
Unincorporated	74,432	32.7	66,547	29.3
Total	**227,356**	**100.0**	**208,124**	**91.6**

The El Paso County Water Master Plan, completed in 2018, provided a robust analysis of future growth trends. The recent development patterns are anticipated to continue, with the northern part of the County seeing new subdivisions and higher density suburban development occurring in and around Falcon and Fountain. The plan notes that the Banning Lewis Ranch, over 24,000 acres which sits along the eastern boundary of Colorado Springs will continue to be a concentrated area of development. As the following projected growth maps show, much of the growth is anticipate along major transportation corridors, including Highways 94 and 83. The primary concerns for development and hazard risks are flooding in the plains areas and fire and landslide or mudslides in the wildland urban interface areas. Development along the southern side of Highway 105 coincide with areas of mapped flood risk and the northern border of the County has large areas noted for potential development which overlap with flood risk in areas. As mapped, Region 3 shows several opportunities for development that also converge with flood risks. While specific develop patterns are not yet known, the potential for risk is apparent. However, the Region 1 mapped growth areas, shown in Figure 3-6, fall outside of high-risk zones and this could be an opportunity to direct development to these areas and away from other identified areas for development through tools such as transfer of development rights.

Figure 3-6: Expected Growth Areas Region 1 and 2

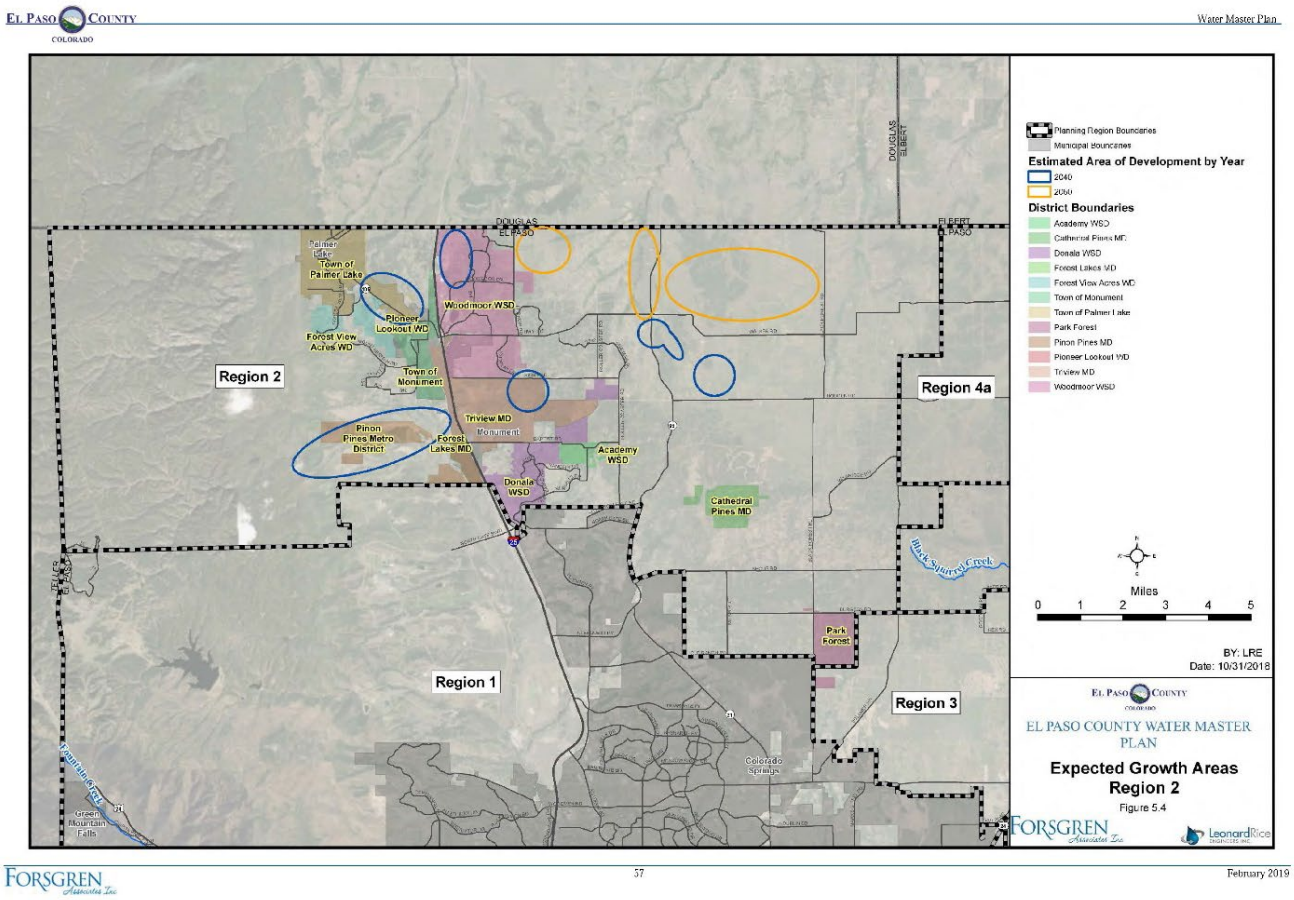


Figure 3-7: Expected Growth Areas Region 3, 4 and 5

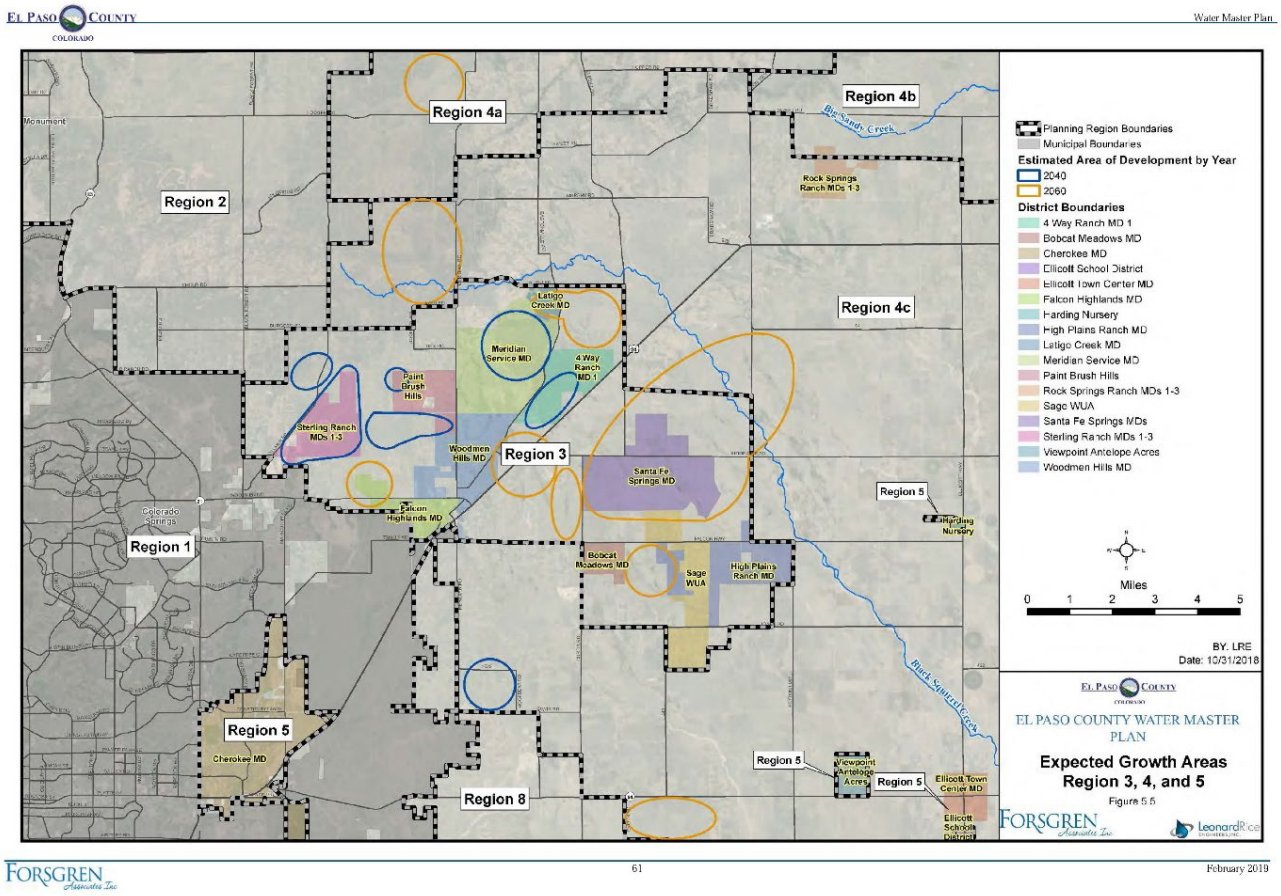


Figure 3-8: Expected Growth Areas Region 7

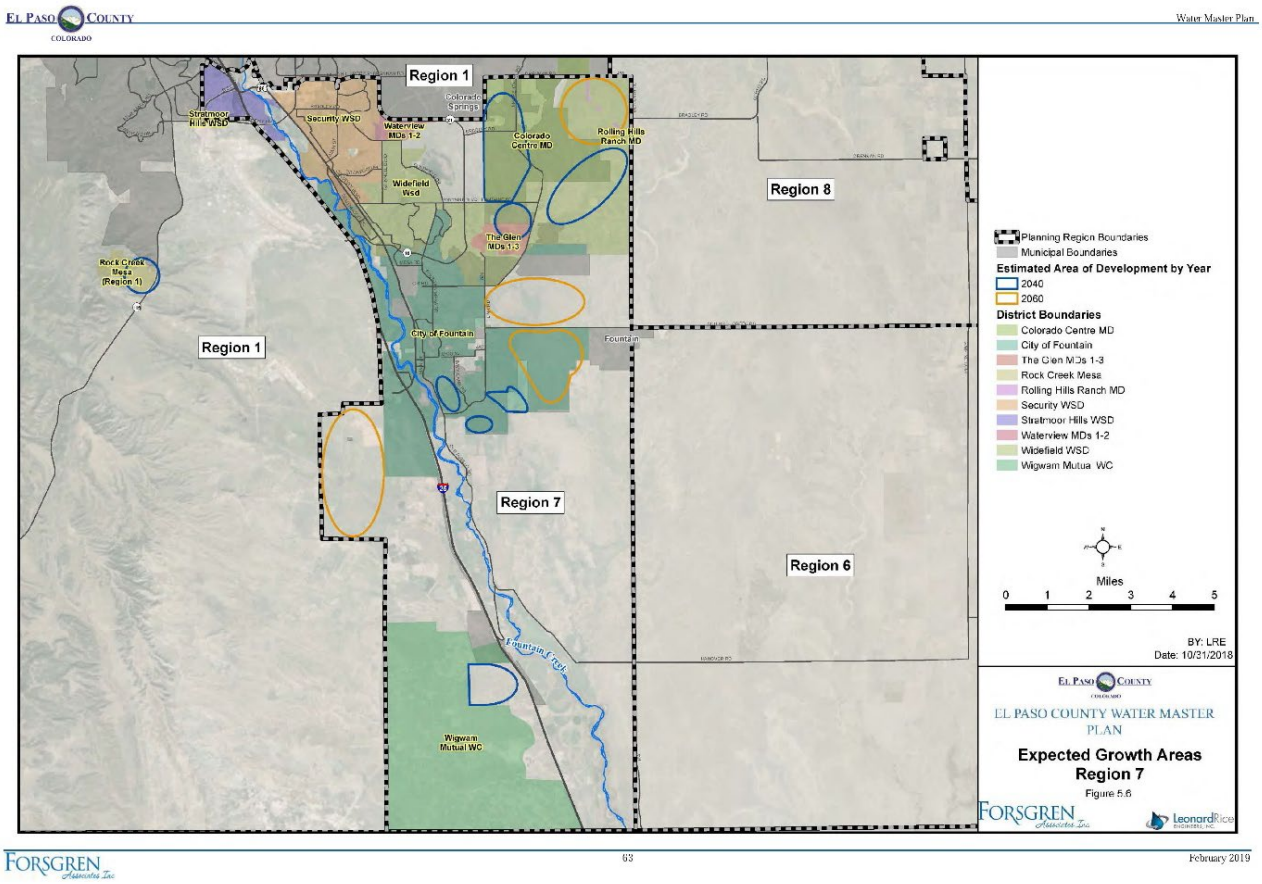
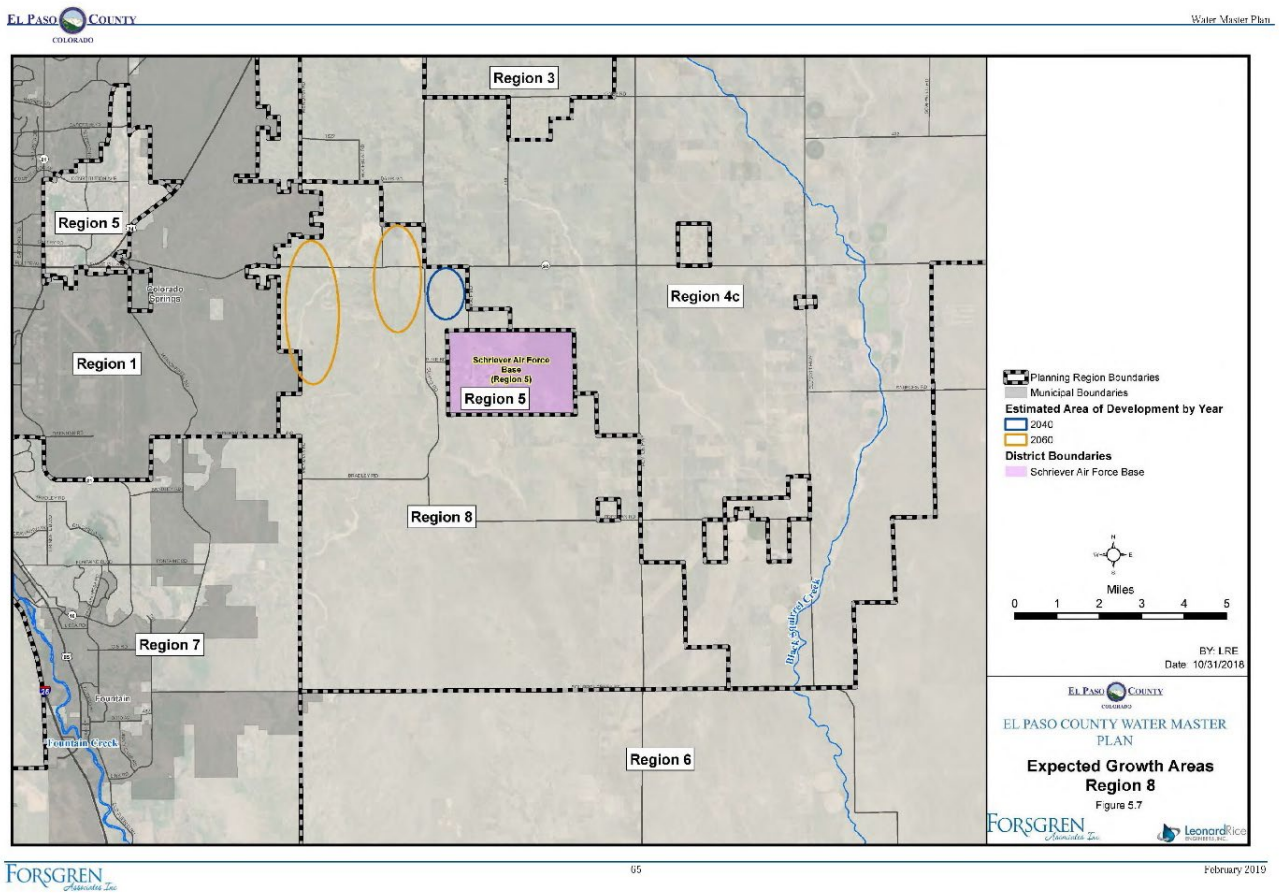


Figure 3-9: Expected Growth Areas Region 8



This work was aligned with water availability for the future growth, and can be easily applied to understanding drought and water availability conditions in El Paso County.

3.1.15 LAWS AND ORDINANCES

Existing laws, ordinances and plans at the federal, state and local level can support or impact hazard mitigation initiatives identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). Pertinent federal, state, and local laws and associated agencies are described below.

3.1.16 FEDERAL

Disaster Mitigation Act

The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Grant Program funds are available to communities. This Plan is designed

to meet the requirements of DMA, improving the planning partners' eligibility for future hazard mitigation funds.

Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- **Endangered** means that a species of fish, animal, or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- **Threatened** means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.
- **Critical habitat** means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."

The Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. The County and partner cities for this plan participate in the NFIP and have adopted regulations that meet the NFIP requirements. At the time of the preparation of this plan, all participating jurisdictions in the partnership were in good standing with NFIP requirements.

3.1.17 STATE AND REGIONAL

Colorado Division of Homeland Security and Emergency Management

The mission of Colorado's Homeland Security and Emergency Management Division is as follows: to lead and support Colorado's effort to prevent, protect, mitigate, respond to and recover from all-hazards events. The Division vision is a prepared, safe, and resilient Colorado.

Colorado Water Conservation Board

The Colorado Water Conservation Board (CWCB) is an agency of the State of Colorado. The CWCB Flood Protection Program is directed to review and approve statewide floodplain studies and designations prior to adoption by local governments. The CWCB is also responsible for the coordination of the NFIP in Colorado and for aiding local communities in meeting NFIP requirements. This includes CWCB prepared or partnered local floodplain studies.

Colorado Geological Survey

The Colorado Geological Survey (CGS) is a state government agency within the Colorado Department of Natural Resources. Its mission is to help reduce the impact of geologic hazards on the citizens of Colorado, to promote responsible economic development of mineral and energy resources, provide geologic insight into water resources, provide avalanche safety training and forecasting, and to provide geologic advice and information to a variety of constituencies. The Colorado Avalanche Information Center is housed in the Colorado Geological Survey.

Colorado State Forest Service

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

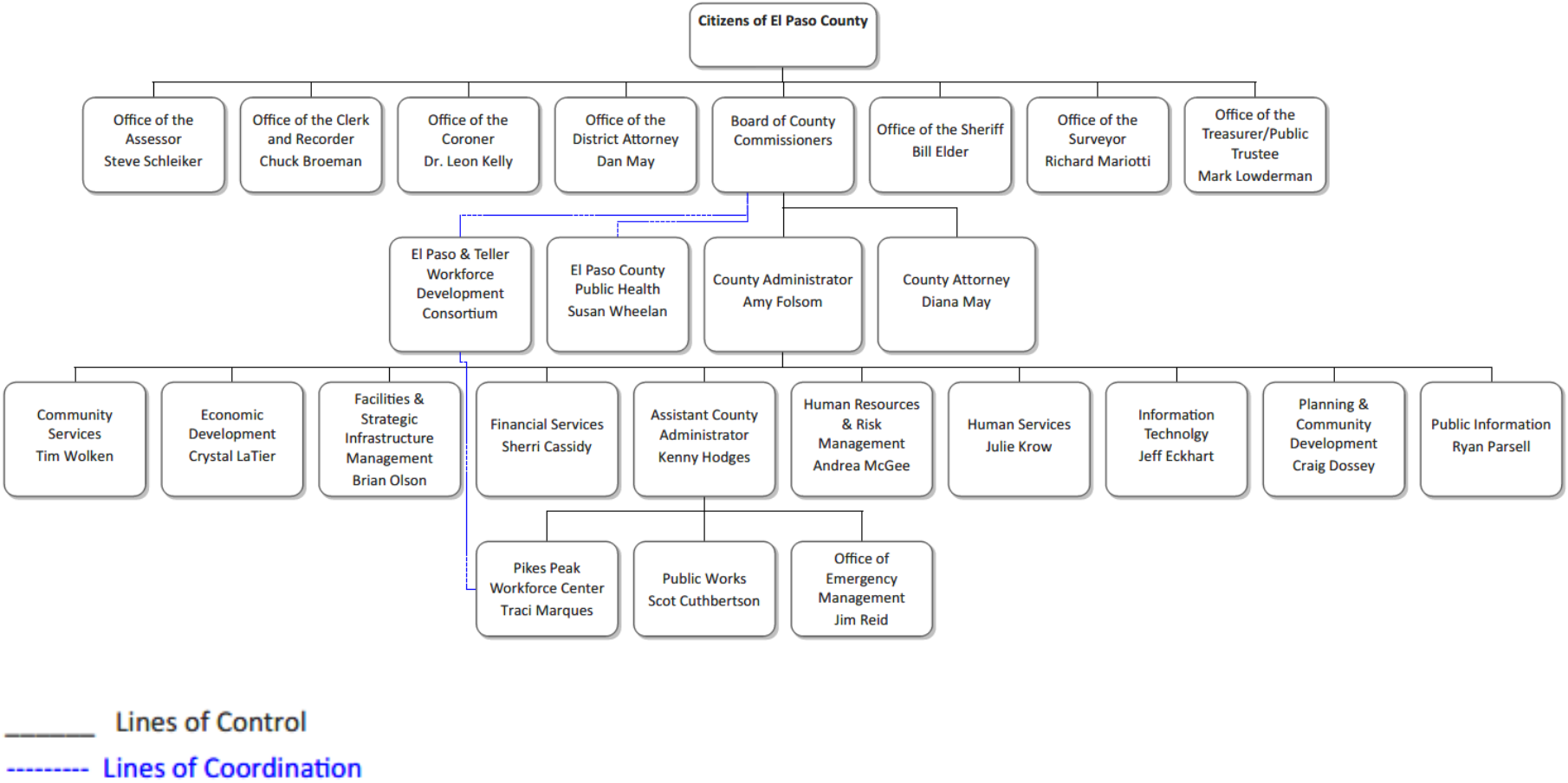
Pikes Peak Area Council of Governments

The Pikes Peak Area Council of Governments (PPACG) is a voluntary organization of municipal and county governments in Park, Teller, and El Paso counties. The PPACG offers participating communities a forum to discuss issues that cross their political boundaries, identify shared opportunities and challenges, and develop collaborative strategies for action. One of the basic activities of PPACG is planning. PPACG assists local elected officials in making coordinated decisions affecting the development of all geographic areas of the Pikes Peak region. The PPACG's role in mitigation is primarily through its environmental program's involvement in the multi-jurisdictional Fountain Creek Watershed Plan.

3.1.18 EL PASO COUNTY

Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities of El Paso County. The organizational structure of the El Paso County government is shown on Figure 3-10.

Figure 3-10: El Paso County Organizational Chart



El Paso County derives its elected official structure and its powers from State of Colorado enabling legislation. The State grants the County such powers as required for the health, welfare, and safety of its residents.

The Board of County Commissioners serves as both the administrative and policy-making body for the County. All powers of the County are exercised by the Board of County Commissioners and not by its individual members.

The Assessor is a constitutional officer elected to a four-year term. The Assessor discovers, lists, and values real and taxable personal property.

The County Clerk and Recorder administers state laws related to motor vehicles and certification of automobile titles; administers primary, general, and special County elections; issues marriage licenses; maintains records and books for the Board of County Commissioners; collects state mandated license fees; maintains property records; and furnishes deed abstracts.

The County Coroner is responsible for the certification of all deaths in its jurisdiction.

The District Attorney is the prosecutor for El Paso and Teller Counties. The District Attorney appears on behalf of the State and counties of the district in all pending criminal proceedings. Other duties include prosecution of criminal violations of state statutes; response to victim's needs; pursuit of consumer fraud complaints; and crime prevention.

The Sheriff maintains the peace, enforces State Statutes, serves court-issued civil process, executes arrest warrants, performs extraditions, transports the mentally ill, maintains criminal justice records, issues concealed weapon permits, coordinates search and rescue activities, and acts as the Fire Warden. The Sheriff operates the El Paso County Criminal Justice Center and also the Community Detoxification Facility.

The County Surveyor represents the County in boundary disputes, notifies the County Attorney of any unsettled boundary disputes or boundary discrepancies with the County, and files all surveys, field notes, calculations, maps, and any other records related to work authorized and financed by the Board of County Commissioners.

The Treasurer is responsible for the receipt, custody, and disbursements of County funds. The Treasurer collects some state taxes and all property taxes including those for other units of local government. The Treasurer sends property tax notices, collects local government property taxes, disburses collection fee receipts, and conducts sales of property for delinquent taxes.

El Paso County Strategic Plan, 2017-2021

El Paso County has utilized a Strategic Plan for many years as its road map to efficient and effective County government. The Plan promotes the creative provision of services; partnerships with other government agencies, non-profit organizations, and the business community; and excellent customer service. The Plan also helps identify priorities for community investment. The Plan is used by County Offices and Administration Departments when developing their respective annual plans that address specific objectives to help address the County's vision, mission, and goals. The goals of the Strategic Plan are to:

- Maintain and promote a financially sustainable County government that is transparent and effective.
- Continue to enhance the understanding of civic services and promote participation, engagement, and confidence in County government.
- Maintain and improve the County transportation system, facilities, infrastructure, and technology.
- Consistently support regional economic strength.
- Strive to ensure a safe, secure and healthy community.

El Paso County Master Plan

At the time of this update, the El Paso County Master Plan is also undergoing an update. The Plan establishes broad goals and policies that are intended to serve as a framework for the development of the County. Among other topics, the draft plan recommendations include updates on zoning and land use, transportation, economic development and health and safety. All of these topics are connected to risk reduction for El Paso County.

El Paso County Planning Commission

The El Paso County Planning Commission advises the Board of County Commissioners on land use requests (with the exception of County Master Plan issues and Location Approvals). The Commission approves rezoning applications, develops or recommends subdivision regulations, reviews plats of subdivisions, and approves the location and extent of roads, parks, public ways, and public utilities.

El Paso County Land Development Code, 2018

The El Paso County Land Development Code was adopted for the purpose of preserving and improving the public health, safety, and general welfare of the citizens and businesses of El Paso County. More specifically, it is the purpose of this Code to:

- Implement the Master Plan and related elements.
- Promote predictability, consistency, and efficiency in the land development process for residents, neighborhoods, businesses, agricultural, and development interests.
- Ensure appropriate opportunities for participation and involvement in the development process by all affected parties.
- Be fair to all by ensuring due consideration is given to protecting private property rights, the rights of individuals and the rights of the community as a whole.
- Guide the future growth and development of the County in accordance with the Master Plan.
- Guide public and private policy and action in order to provide adequate and efficient transportation, water, sewerage, schools, parks, playgrounds, recreation, and other public requirements and facilities.
- Establish reasonable standards of design and procedures for subdivision and resubdivision to further the orderly layout and use of land and to ensure proper legal descriptions and monumenting of subdivided land.
- Ensure that public facilities and services are available concurrent with development and will have a sufficient capacity to serve the proposed subdivision, and, in so doing, ensure that current residents will be required to bear no more than their fair share of the cost of providing

the facilities and services by requiring the developer to pay fees, furnish land, or establish mitigation measures to cover the development's fair share of the capital facilities needs generated by the development.

- Prevent the pollution of air, streams, and ponds; assure the adequacy of drainage facilities; and encourage the wise use and management of natural and biological resources throughout the County to preserve the integrity, stability, and beauty of the community and the value of the land.

Code Enforcement

The Development Services Department, Code Enforcement Officers enforce the El Paso County Land Development Code. Depending upon the type of violation, enforcement staff contact violators who have been reported by neighbors or have been seen by the Code Enforcement Officer when in the field.

El Paso County Community Services Department

The Community Services Department strives to provide excellent quality of life services that are valued by the residents of El Paso County. The Department includes the following divisions: Park Operations, Planning, Recreation and Cultural Services, Environmental Health, Veteran Services, Grants/Community Outreach, and CSU Extension. The divisions or focuses of the Community Services Department that pertain to hazard mitigation activities are discussed below:

- **Planning Division:** The Planning Division provides professional planning, landscape architecture, and project management services. The Division's focus is on parks, trails, and open space planning and support of the annual Capital Improvement Program. The Division also provides expertise in water resources, long range planning for El Paso County, and regional collaborative initiatives.
- **Environmental Health Division:** The Environmental Health Division encompasses Environmental Compliance, Forestry and Noxious Weeds, Household Hazardous Waste, and Natural Resources. El Paso County embraces its responsibility for environmental stewardship by its commitment to initiating innovative, desirable, and sustainable practices in all environmental disciplines. Environmental Compliance ensures that County-owned and operated facilities are compliant with all local, state, and federal environmental regulations
- **Forestry and Noxious Weeds:** The Community Services Department develops and implements policies, procedures, and standards for efficient mapping, monitoring, enforcement, education, and control of tree diseases, forest pests, and noxious weeds.
- **Household Hazardous Waste**: The Department addresses environmental and recycling programs within El Paso County by promoting the philosophy of "reduce, reuse, and recycle," and by accepting an extensive variety of household hazardous waste streams for recycling and/or proper disposal.
- **Natural Resources:** The Department ensures compliance with laws pertaining to threatened and endangered species and wetlands, monitors conservation easements, and reviews subdivision development plans for environmental impacts.
-

El Paso County Public Services Department

El Paso County Colorado Public Services Department is committed to helping the public by providing the best possible service including: contracts and procurement, transportation, maintaining the County's facilities and fleet, security, parking, and the Office of Emergency Management. The primary operations of the Public Services Department include:

- **Facilities Management:** Within the department, the Engineering and the Operations Divisions manage county facilities. Engineering's Infrastructure Planning Section handles property management, site and space planning, energy management and environmental compliance. The Operations Division Facility Management Section maintains over 130 County-owned or leased buildings across 2,126 square miles totaling more than 4,600,000 square feet of space. These two sections also cooperate to maintain more than 132 buildings owned by the City of Colorado Springs and provide engineering services under the terms of an Intergovernmental Agreement approved annually by both City and County.
- **Fleet Management Section:** The Fleet Management Section maintains the County's vehicles and equipment fleet of more than 1,200 assets. The Fleet Management Section provides transportation and construction assets to 21 entities within El Paso County.
- **Transportation:** The Engineering and Operations divisions manage the County's transportation network consisting of more than 2,000 miles of paved and gravel roads and related right-of-way assets. The Engineering Division's Traffic Engineering, Design, Construction Management, Real Estate and Infrastructure Planning Sections handle all aspects of the transportation system from policy and standards to planning to contract project execution. The Operations Division's Highway Section handles in-house maintenance and repair of County roads and bridges, drainage, signs and signals, and right-of-way.
- **Pikes Peak Office of Emergency Management (PPROEM):** PPROEM is responsible for providing mitigation, preparedness, response, recovery, and coordination for large-scale emergencies and disasters, both natural and human-caused, to residents of El Paso County and Colorado Springs for the purpose of saving lives and preventing property damage.
- **HAZMAT:** The PPROEM HAZMAT team coordinates hazardous materials responses within the unincorporated portions of El Paso County, as the Board of County Commissioners Designated Emergency Response Authority (DERA) for El Paso County, in support of the local fire districts and small municipalities. It conducts and coordinate training for the El Paso County Hazardous Materials Team, coordinates hazardous materials responses with other local, state, and regional fire districts and law enforcement agencies in response to requests for assistance, participates in the Local Emergency Planning Committee (LEPC) for El Paso County– a function which is required by SARA Title III Federal Regulations. The regulations implementing SARA Title III are codified in Title 40 of the Code of Federal Regulations, parts 350 through 372. In addition, the HAZMAT team:
    - Maintains and distribute Tier II data as required by SARA Title III Regulations.
    - Conducts site visits of county Tier II facilities and local industry to plan for safer coordinated response to incidents in those facilities.
    - Coordinates El Paso County hazardous materials team participation with local, state, and federal agencies during training exercises.
    - Conducts training with local fire districts and other agencies to enhance initial hazmat response capabilities.

- Operates as the PPROEM liaisons to Incident Command Posts, Emergency Operations Centers, and Department Operations Centers during emergencies.
- Staffs the PPROEM ECC as assigned.
- Participates in PPROEM planning, exercises, and training, as assigned.

- **Security:** The mission of Security and Parking Operations is to protect El Paso County assets (facilities, people, information, and physical assets) and provide professional parking services. To accomplish our mission and to provide the most efficient and effective services possible, the section is divided into three major units: Security officers protect people (elected officials, employees, and visitors to County buildings) and County assets (building infrastructure, equipment, vehicles, information, and other property). Officers also provide escorts, handle access control screening, conduct mail inspections, and perform a variety of patrol assignments. Security analysts conduct risk assessments, evaluate physical protection systems, inspect security and fire systems, conduct investigations, manage the emergency response and evacuation plan, manage the mechanical lock and electronic access control systems, and provide security training.
- **The Special Communications Unit (SCU):** The SCU provides radio operators for all forms of communication, as well as providing supplemental communications to the Sheriff's Office. These supplemental communications include low band, UHF, VHF, HF, digital communications, and repeater capabilities to First Responders, the Incident Command Post, and the EOC. SCU members staff the EOC, Incident Command Post, and other locations as required. They also provide field communications for the El Paso County Search and Rescue team.
- **Radio Amateur Civil Emergency Service (RACES) Unit:** The RACES Unit is a component of the SCU. RACES is administered by FEMA and is part of the Amateur Radio Service that provide communication for civil-preparedness purposes only during periods of local, regional, or national civil emergencies. During times of federal emergencies, RACES members are the only amateur radio operators allowed to transmit over federally-specified frequencies. Only volunteers who hold a valid FCC license are able to join the RACES unit.

El Paso County Community Wildfire Protection Plan, 2011

In 2010, the El Paso County Board of County Commissioners passed a resolution establishing the El Paso County Community Wildfire Protection Plan Commission to prepare and implement the El Paso County Community Wildfire Protection Plan (CWPP). This El Paso County CWPP is broad-scale, and not suitable for site-specific project design; nor was it the intention of the plan developers that this CWPP would replace any existing CWPPs completed by local communities. CWPPs prepared for individual subdivisions, neighborhoods, or fire protection districts capture the level of detail needed to take specific local actions. The development of local CWPPs brings together the neighborhood groups that plan mitigation projects and, in many cases, do the hands-on work.

El Paso County Wildfire Preparedness Plan, 2020

The purpose of this County Wildfire Preparedness Plan is to clarify roles and responsibilities of Fire Protection Districts, Fire Departments, the El Paso County Sheriff and the Colorado Division of Fire Prevention and Control (DFPC) in responding to wildfires, to establish standard operating guidelines, to

implement cooperative fire protection on all lands in El Paso County and identify a process for transfer of an incident from District to County and if needed County to State.

El Paso County Sheriff's Office, Emergency Services Division

This Division is responsible for coordinating forest and prairie fire response, fire investigations in unincorporated county areas, and search and rescue. In fulfillment of statutory responsibilities, the Division oversees the El Paso County Search and Rescue, the El Paso County Wildland Fire Team, and the Sheriff's Fire Investigation's Team. These Teams are supported by over 150 volunteer responders who are dedicated professionals in their career fields.

The teams and organizations that support the Emergency Services Division include:

- **El Paso County Wildland Fire Management (EPSOWF):** El Paso County Wildland Fire Management is a combination of career and volunteer members comprised of citizens from El Paso County and the surrounding areas dedicated to saving lives and property that are affected by fire. The crew members come from all walks of life to assist in these endeavors. Members are highly trained, hard-working individuals that give their time in protecting the citizens of El Paso County. The fire season in Colorado is year around and Wildland Fire Management members are available 24-7 to provide suppression efforts. Additionally, members provide mitigation and hazard fuels removal, prescription burns and public education. During major weather events team members have been called upon to assist El Paso County OEM with search and rescue and clearing roads of debris. The Wildland Fire Crew has responded to and assisted in suppressing wildland fires in El Paso County and surrounding areas for 26 years. These fires are as small as camp fires and small lightning strike fires to major wildland fires including the Hayman fire in 2002, the Waldo Canyon fire in 2012, the Black Forest Fire in 2013, and the 117 Fire in 2018. Wildland Fire Management assists all area cooperators including the United States Forest Service, the Bureau of Land Management, the Colorado State Forest Service and the Department of Defense.
- **El Paso County Search & Rescue:** The El Paso County Search & Rescue is a mountain search and rescue unit dedicated to saving lives through search, rescue, and mountain safety education. The team is composed solely of volunteers and is available upon request for help with mountain search and rescue anywhere in Colorado under the authority of the local county sheriff or in other states and countries under local authority. The team is able to search for downed aircraft and lost people by tracing the location of the aircrafts emergency location transmitter, as well as personal locator beacons. There is never a charge for search and rescue services and they are on call year round 24 hours a day. The members of the team are unpaid volunteers selected from the community.

Emergency Operations Plan, 2020

This Base Emergency Operations Plan [EOP] is developed for use by PPROEM, in support of county and municipal governments, as well as support and coordination with individual agencies to ensure prevention, preparedness, mitigation, response and recovery for hazards that may affect the City of Colorado Springs, other municipalities, and unincorporated areas in El Paso County, Colorado. PPROEM support is to provide resources and actions that fall outside the response agency essential missions and functions. PPROEM coordination is to manage this support. This plan is used to:

- Support PPROEM's program and Emergency Coordination Center (ECC) activations as an all-hazards plan by defining the structure and processes utilized to prevent, mitigate, prepare for, respond to, and recover from an event.
- Establish coordinated processes for supporting regional emergency management by defining roles and responsibilities and providing guidelines to maintain and restore essential functions.
- Identify scalable, flexible, and adaptable coordinating structures linking local, state, and federal governments, the private sector and nongovernmental and community organizations that play vital roles in emergency management.
- Provide emergency management planning and program guidance to support the Pikes Peak Region's agencies so that they can achieve essential missions and functions under all threats and conditions.

This plan is supported by functional annexes, plans and processes that focus on emergency and disaster missions, actions, roles, and responsibilities for PPROEM and other departments, agencies, and supporting organizations. In addition, all these groups have internal policies, procedures, and plans which further define how the community is supported.

El Paso County Public Health Department

The mission of the El Paso County Public Health Department is to promote and protect public health and environmental quality in the community through people, prevention, and partnerships. The vision of the Department is to provide the highest level of customer service and to be recognized as the healthiest county in the nation. The Public Health Department is dedicated to assuring that the citizens of El Paso County receive quality, efficient, effective public health services.

Local Emergency Planning Committee (LEPC)

The Emergency Planning and Community Right to Know Act of 1986 called for the establishment of local emergency planning committees. The mission of the El Paso County local emergency planning committee is to promote safety in the community through hazardous materials awareness, planning efforts, encouragement of cooperative partnerships between the community and industry, and development of educational and training programs relative to hazardous materials and emergency preparations for County Emergency Responders, Industry, and the Community.

The El Paso County Local Emergency Planning Committee has two goals: (1) to improve emergency response capabilities by maintaining accurate and pertinent information about hazardous materials in the community so emergency responders can safely respond to accidents; and (2) to promote community awareness. In addition to its formal duties, the Committee can provide the community information about hazard substance emergency planning, and health and environmental risks.

Medical Reserve Corps of El Paso County

Medical Reserve Corps of El Paso County was officially chartered in January 2004 through a Department of Health and Human Services grant. The Medical Reserve Corps brings together persons and agencies

involved in emergency planning and response to share and coordinate information and plans in a manner most beneficial to the region.

The Corps works with the city and county offices of emergency management, regional Citizen Corps', health departments, and state agencies to coordinate and integrate, as appropriate, into existing, broader emergency and response plans. Through these efforts, the Corps brings a greater predictability to volunteer resource capability and strengthens the medical response in disaster and public health areas of need.

Colorado Voluntary Organizations Active in Disaster

Colorado Voluntary Organizations Active in Disaster (COVOAD) is a network of voluntary organizations working together to encourage more efficient service delivery to people affected by disasters in the State of Colorado. COVOAD achieves this by facilitating effective cooperation, coordination, communication, and collaboration at all community levels, and by providing a platform to foster partnerships among non-profit and faith-based organizations, the private sector, and government agencies.

3.1.19 TOWN OF CALHAN

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the Town of Calhan.

The Town of Calhan's governance and administration consists of a Mayor, six-member Board of Trustees elected by the citizens and a full-time Town Clerk/Treasurer. The town has a population of approximately 800 residents. There have been no zoning regulations enacted within the town except for banning marijuana clubs and camping restrictions. Growth management has not been an issue for many years, requiring no ordinances or regulations at this time.

Calhan Comprehensive Plan, 2002

This plan includes details about Calhan at the time the plan was completed, an analysis of current trends, a forecast of potential future growth, and long-term goals and implementation strategies. This plan was developed with the assistance of a grant from Colorado Center for Community Development and is currently being reviewed to determine if an update is required. Relevant plan goals and actions include forming a historic preservation commission to preserve and protect Calhan's heritage (Goal 9.2, Action A-4), collaborate with El Paso County and surrounding towns to protect the areas major attractions: Paint Mines, Big Sandy Creek, and Ramah Reservoir (Goals 9.3, Action A-1) and encourage new development to protect terrain and preserve significant vegetation, scenic views, and incorporate natural trees and shrubs into landscape plans (Action A-3)

Finally, Calhan's land use and growth management goal incorporates floodplain management and increasing coordination with El Paso County using intergovernmental agreements.

Subdivision Ordinances Town of Calhan Ordinance Book – Chapter 15, ~2019

This section contains excerpts from the Subdivision Ordinances that are related to hazard mitigation.

Sec. 15.04.050 - Review Process

The review process notes that subdivision plans shall be consistent with the Master Plan and adhere to maintaining adequate and safe drinking water supply.

Section 15-17-030, drainage, lays out the requirements for land within the 100-year floodplain or impacted by historical flow patterns.

> B. Land within an adopted one hundred (100) year floodplain zone, or land which is subject to inundation by a one hundred (100) year flood, shall not be platted for occupancy unless the flooding condition is alleviated in conformance with the Town's floodplain regulation.
>
> C. Historical flow patterns and runoff amounts are to be maintained in such a manner that would preserve the natural character of the area and prevent property damage of the type generally attributed to runoff rate and velocity increases, diversion concentrations and/or unplanned collection of storm runoff.
>
> E. Detention storage shall be provided by any method specified in the Drainage Criteria Manual.

Flood Ordinance, 2013 (ORDINANCE NO. 2013-09)

Purpose. It is the purpose of this Article is to promote the public health, safety, and welfare by provisions designed to:

(1) Protect human life and health;

(2) Minimize expenditure of public funds for costly flood control projects;

(3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

(4) Minimize prolonged business interruptions caused by flooding;

(5) Minimize damage to critical facilities, infrastructure and other public facilities such as water, sewer and gas mains; electric and communications stations; and streets and bridges located in floodplains;

(6) Maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and

(7) Ensure that potential buyers are notified that property is located in a flood hazard area.

Building and Code Enforcement

The Town of Calhan employs a part-time building inspector to handle any new structures, improvements to existing buildings, and all building code reviews. The building inspector, in conjunction with the Planning and Development Committee reviews all plans for new structures prior to construction to ensure all requirements are met. The town adopted the International Building Code for 2006 after an extensive review by the building inspector. Code enforcement is handled by the Calhan Police Department.

Local Emergency Operations Plan, 2014

The Town of Calhan has in place a Local Emergency Operations Plan, last updated May, 2007. This plan is reviewed every year and updated as needed. There have also been meetings to review the entire plan when a high percentage of personnel or significant positions, such as board members, have changed. This plan includes: a help list for the public including a list of tasks to help mitigate the effects of emergencies; an outline of the basic plan and who is in charge of particular tasks; specific actions for specific emergencies including flash flooding, severe thunderstorms, and tornadoes; and a local disaster contact list including shelters that is updated annually.

Police

The Calhan Police Department provides law enforcement services to protect life and property for the community within the town limits. The Town currently employs one full-time Police Chief, two full-time officers, and three reserve officers. Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office, and the El Paso-Teller County 911 Authority.

Fire

The Town of Calhan is part of the Calhan Fire Protection District based in Calhan, Colorado in El Paso County. All fire departments within El Paso County, as well as some in Elbert and Teller County have a Mutual Aid Agreement in place. This agreement was executed and signed by all departments in 2000. The Town of Calhan currently has an ISO rating of six. The Fire Department is very active within the community despite being a volunteer fire department.

Public Works

The Public Works Department consists of a Public Works Director, two full-time employees and part-time help in the summer that handle town roads, parks, the cemetery, as well as water and sewer services. The Town of Calhan has been working to pave streets and improve drainage within the town limits to increase access. The town passed a sales tax in 2013 for street maintenance to improve roads and develop a town-wide drainage plan. While flash flooding has not been a large issue, drainage has proven to be inadequate on the streets.

Water and Wastewater

The Public Works Department handles all aspects for the water and wastewater system. The town is supplied with three deep wells that provide potable water for the residents. The town also has a lagoon system for wastewater. While the lagoons provide adequate capacity at this time for town use, this system will need to be upgraded in the near future. Calhan is responsible for the safety, protection, and maintenance of both water and wastewater systems within town boundaries. The main near-term objective is to replace old mains for both water and sewer. The system is more than 15 years old for the newest lines and more than 20 years old for some of the older lines. The Town is also researching the potential for an Intergovernmental Agreement with the Towns of Ramah and Simla for emergency water supplies.

3.1.20 CITY OF COLORADO SPRINGS

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the City of Colorado Springs.

The City of Colorado Springs is the most populous city in all of El Paso County, with an estimated population of approximately 473,000 as of 2018. The city covers 186.1 square miles and is situated at the base of Pikes Peak at the eastern edge of the Rocky Mountains. The City of Colorado Springs has a variety of plans and functions in place that guide growth and development within the community. The City Council consists of nine members; one member from each of the six council districts and three at-large members. The City employs a City Attorney, Auditor and Clerk, along with multiple departments to review development.

City of Colorado Springs Hazard Mitigation Strategy Annual Report (2018)

The City of Colorado Springs developed a separate Hazard Mitigation Plan in 2016. Laid out in this Plan are a multitude of hazard mitigation actions to be completed. In addition, a Hazard Mitigation Planning Committee, led by the Colorado Springs Office of Emergency Management, was created to review and report on the status of these actions. As of 2018, the following have been addressed or are in the process of being addressed:

- Wildfire Mitigation Actions (5)
- Flood and Dam/Levee Failure Actions (11)
- Severe Weather Actions (7)
- Geologic Hazard Actions (6)
- Human-Caused Hazard Actions (9)
- Ongoing Practices (Carried through from Mitigation Actions in 2010 Plan) (23)

Colorado Springs Comprehensive Plan (2019)

The Colorado Springs Comprehensive Plan, or PlanCOS, was initiated to provide the community's plan for physical development of Colorado Springs. Of the main goals for the City, six themes are identified which include providing vibrant neighborhoods, unique places, a thriving economy, strong connections between main corridors, renowned culture, and majestic landscapes. PlanCOS provides a guide for development over the next 20 years and is designed to address ongoing issues identified by the community and community leaders.

It is anticipated that the population in El Paso County could increase by approximately 300,000 by the year 2040 and a job growth of approximately 145,000 employees. Colorado Springs is expected to account for 65% of this total growth. With this vast increase in population, this focused plan was required to identify future land use and the physical development of the City.

City of Colorado Springs Strategic Plan (2020-2024)

The City of Colorado Springs developed a strategic plan for the next four years encompassing infrastructure, community, economy, and other key aspects of a successful community. The main mission for the plan is "Upholding the vision our City's founding fathers developed and the values of our Western heritage, Colorado Springs will be a city where people love to live, work and vacation". In order to accomplish this mission, four main goals are addressed.

- Promoting Job Creation

  - Collaborate with regional partners to attract a diverse economic base to Olympic City USA. This focus includes corporate and small businesses, entrepreneurial start-ups and Opportunity Zones to create diverse and sustainable economic growth.
- Investing in Infrastructure
  - Continue to address infrastructure and transportation needs by providing smart and innovative mobility solutions to create a connected, safe, and accessible community. This should include trails and multimodal access, as well as traditional modes of transit. Cultivate the City's natural amenities to reflect its majestic landscapes for today and the future.
- Building Community & Collaborative Relationships
  - Provide strategic city services and community partnerships to improve citizen quality of life by reducing crime, reducing the number of persons experiencing chronic homelessness, increasing affordable housing opportunities, and facilitating community investment. Collaborate with other governmental agencies and military installations.
- Excelling in City Services
  - Provide excellent and sustainable delivery of core services by making data driven investments and decisions. Support continuous improvement and cross departmental collaboration to improve service delivery to residents and provide for their public safety.

Colorado Springs Utilities Strategic Plan (2020)

The strategic plan guides the Utilities Board which has primary and ultimate responsibility for ensuring the benefits of local ownership and control to the citizens of Colorado Springs. The Utilities Board also has a responsibility to its current and future customers by balancing rates, reliability and relationships. The goal for balancing rates is to provide financial stability, ensure resources are used responsibly, and ensure the customer is receiving a good value. Reliability will be achieved through providing on-demand energy and water service, ensuring system reliability, and continuing to be a trusted community service provider. Relationships will be maintained by keeping customers safe and satisfied and employing individuals who are engaged, innovative and customer-focused.

Building and Code Enforcement (Pikes Peak Regional Building Department)

The Pikes Peak Regional Building Department (PPRBD) was created by an Inter-Governmental Agreement (IGA) between the El Paso County Board of County Commissioners and the City Council of Colorado Springs in 1966. Today the PPRBD services unincorporated El Paso County; the cities of Colorado Springs, Fountain and Manitou Springs; the towns of Green Mountain Falls, Monument and Palmer Lake; and in Teller County, the City of Woodland Park.

The Pikes Peak Regional Building Department focuses on safeguarding life and limb, health, property and the public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy of all buildings and structures in its area of responsibility. The goal of PPRBD is to ensure life safety and welfare of its citizens through efficient and consistent application of adopted codes and standards.

The Department is governed by the Regional Building Commission. The Commission is composed of a three member governing body consisting of one County Commissioner designated by the El Paso County Board of County Commissioners, one council member designated by the City Council of Colorado Springs and one elected official, chosen by the other member jurisdictions served by the PPRBD.

The Department is designed to be self-supporting and nonprofit making. Annually an independent auditor conducts a cost analysis which helps us determine our operating expenses and set fees. PPRBD has adopted and implemented the 2015 IBC, 2015 IRC, 2015 IMC, 2015 IPC, 2017 NEC and 2015 IECC and incorporated these into the 2017 Regional Building Code.

Police

The Colorado Springs Police Department (CSPD) consists of three bureaus, each with multiple divisions, sections, and units. The Patrol Bureau, Operations Support Bureau, and Investigative & Special Operations Bureau all report to the Office of the Chief of Police.

Patrol Bureau -The Patrol Bureau is comprised of the four, geographically located police substations. The officers of the Patrol Bureau are responsible for carrying out the CSPD's day-to-day mission of responding to calls for service and patrolling the city.

Operations Support Bureau – The Operations Support Bureau is broken down into three divisions. These are the Management Services Division, Professional Standards Division, and Public Safety Communications Center. The officers and civilians who make up these divisions support patrol operations, investigate major crimes and provide support services to the entire department.

Investigative & Special Operations Bureau - The Investigative & Special Operations Bureau is broken down into three divisions. These are the Investigations Division, Special Enforcement Division and Metro Vice, Narcotics, and Intelligence Division. The officers and civilians who make up these divisions conduct the majority of investigations into crimes against persons, conduct motorcycle traffic enforcement, and handle many serious critical incidents and special events; as well as narcotics and vice investigations for the Pikes Peak region.

Fire

The Colorado Springs Fire Department has staffed emergency response resources deployed throughout the city in order to reach the site of an incident within 8 minutes from the time of the call 90% of the time. If an emergency is not primarily law enforcement related, the CSFD is generally the agency that responds to your 911 call for help. The department fully staffs 23 engine companies, 6 truck companies, 1 hazmat Team, 1 Heavy Rescue Team, and 3 medical Squads. In addition, the department has 11 brush trucks for wildland firefighting, 1 air supply truck, 1 hazardous materials decontamination vehicle, and 1 hose wagon that can also be staffed with personnel and dispatched to emergencies.

Public Works

The Public Works Department is located in the City Administration building and is responsible for street maintenance, snow removal, traffic management, parking programs, transit, and other infrastructure needs for the City. Construction projects are continuously being completed based on master planning

documents completed by the City and include bridge projects, roadway projects, stormwater projects, and paving operations. In 2015, voters passed Ballot 2C which imposes additional taxes to proceed with road maintenance funded through the Pikes Peak Rural Transportation Authority. A reduced tax rate of 0.57% for these functions are set to start January, 2021.

Water and Wastewater

Colorado Springs Utilities (CSU) handles all water and wastewater for residential and commercial within the service area of Colorado Springs. They provide GIS Mapping services via a public portal that provides utility data for water, wastewater, gas and electric. CSU provides construction review services related to land development, backflow prevention for commercial, and all other pertinent utility functions for water, wastewater, gas and electric.

3.1.21 CITY OF FOUNTAIN

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the City of Fountain.

Fountain is a vibrant community just south of Colorado Springs, Colorado located adjacent to Fort Carson. The City of Fountain has a rich heritage, rooted in the military, agriculture, and the railroads. Fort Carson calls itself the "best hometown in the Army" and the City of Fountain is home to many of the men and women serving our country. The City of Fountain's governance and administration consists of a mayor, six-member City Council elected by the citizens, and a full-time staff. The town has a population of approximately 30,500 residents.

City of Fountain: Comprehensive Development Plan, Resolution 05-054, 2005

The City adopted a major update to its Comprehensive Development Plan in 2005. The Fountain Planning Commission uses this Comprehensive Development Plan as a guide to determine if land use changes are in keeping with the overall pattern of development desired by the City and its citizens. The Plan is an advisory guide to land use decisions in the community.

In 2019, the City adopted a Strategic Plan, which provides a framework for rational decision making. Growth management strategies and policies are incorporated in the Comprehensive Development Plan.

City of Fountain Zoning Ordinance, 2020

Last major update to Zoning Ordinance (Title 17 of the Fountain Municipal Code [FMC]) was approved by the City in 2020. This Ordinance is written in accordance with the Fountain Comprehensive Development Plan and is designed for promoting the health, safety, convenience, and welfare of the citizens of Fountain. The ordinance is intended to lessen congestion in the streets, provide adequate light and air, encourage the most appropriate use of land, ensure the protection and preservation of open lands and natural amenities, and conserve the value of property in accordance with the Fountain Comprehensive Development Plan

City of Fountain Subdivision Regulations, 2008

A major update to the Subdivision Regulations (Title 16.20 FMC) was approved by the City in 2008 with a few minor updates since then. The Fountain Subdivision Regulations were enacted to promote the health,

safety, convenience, and general welfare of the citizens of the City. The subdivision of land is the first step in the process of urban development. The arrangement of land parcels for residential, commercial, industrial, recreational, utility, and other public purposes will determine to a large degree the qualities of health, safety, convenience, environment, and general welfare of the City.

Notably, the subdivision standards are designed to prevent flood damage to persons and properties and minimize expenditures for flood control and restrict building on flood lands, shorelands, wetlands, areas covered by poor soils, or in areas otherwise poorly suited for building or construction.

City of Fountain Floodplain Management

The Pikes Peak Regional Building Department is responsible for Floodplain Management in almost all of El Paso County, including the City of Fountain. The Floodplain Code defines flood reduction methods and hazard area identification in order to protect public health, safety and general welfare.

City of Fountain Storm Water Quality Management and Discharge Plan, 2007

The City adopted the Storm Water Quality Management and Discharge Code (Title 16.10 FMC) in 2007 with a few minor amendments since then. The purpose and intent of this chapter is to ensure the health, safety and general welfare of citizens, and to protect the water quality of watercourses and water bodies in a manner pursuant to and consistent with the Federal Clean Water Act (33 U.S.C. Section 1251 et seq.) by reducing pollutants in storm water discharges to the maximum extent practicable and by prohibiting non-storm water discharges to the City's municipal separate storm sewer system. This plan is managed by the City of Fountain Storm Water Enterprise and the City of Fountain Department of Public Works.

City of Fountain Building Code

The 2015 International Building Code as amended by the 2017 Edition of the Pikes Peak Regional Building code and was adopted by the City of Fountain in 2018 (Ordinance No. 1707). The 2015 edition of the International Fire Code with appendices and amendments was adopted by the City of Fountain in 2019 (Ordinance No. 1715).

City of Fountain Community Services Department

The mission of the Community Services Department is to enrich individuals, families and the community through the provision of services, facilities and programs; to enhance the character and diversity of the City's neighborhoods; and to support sustainable land use practices which contribute to a better quality of life. The Community Services Department includes the Planning Division, Code Enforcement Division and Parks Division.

City of Fountain Emergency Operations Plan, 2016

This plan was completely rewritten and adopted by the City of Fountain in 2016. The purpose of the EOP is to minimize the loss of life and property during and while recovering from an emergency or disaster through effective management of the emergency. The Plan is applicable to all elements of city government and the private sector engaged in, or acting in support of, emergency operations. These tasks will be accomplished through:

(a). Identification of the roles, responsibilities and actions required of City departments and other agencies in preparing for and responding to major emergencies and disasters;

(b). Ensuring a coordinated response by local, State, and Federal governments by the use of the NIMS in managing emergencies or disasters; to save lives, prevent injuries, protect property and the environment, and to return the affected area to a state of normalcy as quickly as possible;

(c). Providing a framework for coordinating, integrating, and administering the emergency operations plan and related programs of local, State, and Federal governments;

(d). Providing for the integration and coordination of volunteer agencies and private organizations involved in emergency response and relief efforts;

(e). Establishing the framework for all plans developed and used by participating agencies, City departments and enterprises; and

(f). Establishing the governing plan for all emergency plans within the City of Fountain.

City of Fountain Office of Emergency Management (OEM)

The City of Fountain Office of Emergency Management (OEM) provides coordination and support of activities relating to disaster prevention, preparedness, response and recovery to protect the lives of the citizens in our City. These tasks will be accomplished through the Incident Command System (ICS):

- Is a standardized management tool for meeting the demands of small or large emergency or non-emergency situations.
- Represents "best practices" and has become the standard for emergency management across the country.
- May be used for planned events, natural disasters, and acts of terrorism. Is a key feature of the National Incident Management System (NIMS).

The ICS is a management system designed to enable effective and efficient domestic incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to enable effective and efficient domestic incident management. A basic premise of ICS is that it is widely applicable. It is used to organize both near-term and long-term field-level operations for a broad spectrum of emergencies, from small to complex incidents, both natural and manmade.

City of Fountain Police Department

The Police Department protects the community and provides law enforcement services to protect life and property within the City of Fountain. The Fountain Police Department is a full-service department, with Patrol, Detectives, Emergency Service Unit, School Resource Officer, Drug Abuse Resistance Education, K-9, Dispatch, Records, Traffic, and Support Services units. The Police Department currently has 40 full-time patrol officers assigned to seven teams, each supervised by a sergeant. Officers on each team are permanently assigned to one of four districts within the City.

Fountain Emergency Communications (Component of Police Department)

Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office, and the El Paso-Teller County 911 Authority. The City of Fountain uses El Paso County Dispatch for emergency calls.

City of Fountain Fire Department

The City of Fountain Fire Department is committed to protecting citizens, visitors, animals, property and the environment within the community. The Fire Department will be responsive to the needs of citizens and visitors by providing rapid, professional, humanitarian services essential to the health, safety and well-being of the community. The Fire Department accomplishes its mission through prevention, fire suppression, advanced medical services, hazard mitigation and other related emergency and nonemergency activities. The department actively participates in the community, serves as role models, and strives to effectively utilize all of the necessary resources available to provide a service deemed excellent by the citizens of Fountain.

The City of Fountain Fire Department covers a city of 25 square miles and 19 miles of Interstate 25 from mile post 135 south to the Pueblo County line, mile post 116. The department has 33 career fire fighters and 40 volunteer fire fighters and support staff, which work out of three fire stations. The Fire Department provides fire suppression, fire prevention and education, basic and advanced medical life support, ambulance transport, hazardous materials unit, heavy rescue unit, technical rescue team, and wildland fire team. The City of Fountain Fire Department has an ISO rating of three.

City of Fountain Public Works Department

The Public Works Department provides essential infrastructure construction and maintenance, municipal services, and mitigation of emergency conditions for the benefit of Fountain's residents, and to impact the infrastructure and municipal services so the streets and sidewalks remain sound and serviceable and the environment remains safe and healthy. Public Works includes Storm Water Management, the City Transportation Division, and the City Street Department.

City of Fountain Utilities Department

The City of Fountain Utilities Department includes the City Electric Department and City Water Department. The mission of the City of Fountain Electric Department is to meet the current and future needs of their customers by providing reliable, cost effective energy and services, in a responsible, courteous and efficient manner. The Water Department includes the Water Superintendent, Water Resources Engineer, Water Foreman, and six Water System Operators. Also among the Water Department's crew are the Water Meter Technician and Administrative Assistant. Together, this team continues to meet daily operational needs and water demands while fulfilling the Water Department's primary goals and objectives to "Provide Fountain residents with the highest quality of water at a reasonable price."

Water and Wastewater

There are three special districts that also provide water and wastewater services to portions of the City of Fountain. The Security Water and Sanitation District provides services to the northern portion of the City off of S. Highway 85/87, North of Fontaine Boulevard. The Widefield Water and Sanitation District

provides services along the east of the railroad tracks, S. Highway 85/87 south of Fontaine Boulevard and north of Rice Lane. The Widefield Water and Sanitation District also provides services to Northeast Fountain east of Sneffels Road and north of C&S Road. The Fountain Sanitation District provides services to the majority of the City covered by Fountain Water Department. The three Special Districts coordinate closely with the Fountain Water Department, Fire Department, and Planning Division.

3.1.22 TOWN OF GREEN MOUNTAIN FALLS

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the Town of Green Mountain Falls.

The Town of Green Mountain Falls has multiple plans and functions in place that guide growth and development within the community. The town governance and administration consists of a Board of Trustees elected by the citizens, a full-time Town Clerk who is appointed by the Board of Trustees, a Public Works Director, and a Town Marshal. The policies and procedures of the town, including codes and regulations, are set by the Board of Trustees.

Green Mountain Falls Comprehensive Plan, 2019

Green Mountain Falls has a Comprehensive Plan first written in 1996 and updated in 2019. The Plan provides information, policies, and guidance on community topics, including land use, community character, public services and facilities, and environmental quality. Green Mountain Falls, as stated in the report, has begun implementing objectives identified in the 2015 EPC HMP as part of the overall strategic goal of the region.

Green Mountain Falls Land Use Code, Chapter 6, (Last Amended Ordinance 2020-03)

Based on the terrain features in Green Mountain Falls, growth is limited and managed. Approximately 675 people reside in Green Mountain Falls year-round. That number increases significantly in the summer as people from other states arrive to use their family cabins. All zoning, subdivision and housing regulations, and building codes not covered under the Pikes Peak Regional Building Department (PPRBD), and land use guidelines are addressed within the Land Use Code.

> **6-1-3 Purpose:** This Land Use Code is designed and enacted for the purpose of promoting the health, safety, morals, convenience, order, prosperity and welfare of the present and future inhabitants of the town. Some major focuses of this plan include identification of natural and man-caused hazards, drainage, roads, utilities and water resources.
>
> **6-2-5 Drainage:** Preservation of natural drainage patterns and provision for detention facilities.
>
> **6-2-8 and 6-2-9 Road Design and Construction:** New and upgrading of roadways and development impact.
>
> **6-5-5 Preliminary Plat:** This section defines procedures for approval of land improvements.

Planning Commission

The Green Mountain Falls Planning Commission offers information and assistance in matters of permitting, zoning requirements, and the Master Plan for the town. The Commission works in close conjunction with the PPRBD.

Flood Ordinance, 2002 (03-2002)

Purpose. It is the purpose of this section to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designated to:

(1) Protect human life and health;
(2) Minimize expenditure of public funds for costly flood control projects;
(3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
(4) Minimize prolonged business interruptions caused by flooding;
(5) Minimize damage to critical facilities, infrastructure and other public facilities such as water, sewer and gas mains; electric and communications stations; and streets and bridges located in floodplains;
(6) Help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas;
(7) Ensure that potential buyers are notified that property is located in a flood hazard area; and
(8) Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

Building and Code Enforcement, 2018 (Ordinance 2018-01)

Floodplain and Building Codes are established through the PPRBD in Colorado Springs. The PPRBD's main goal is to safeguard life and limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, as well as use and occupancy of all buildings and structures within Green Mountain Falls. This is accomplished through the enforcement of minimum building code standards. Also, the building department performs comprehensive inspections of alterations and additions to all buildings to ascertain compliance with numerous building codes.

The Floodplain Management Office provides services including:

- Plans review for proposed alterations and construction
- Issuing Floodplain Development Permits
- Maintaining local floodplain maps and documents
- Inspections of approved new development
- Investigations of floodplain violations
- Resolving violations and enforcing regulations.

Local Emergency Operations Plan, 1998

The Local EOP for the town is currently under review and is being updated with assistance from the PPROEM. The mission stated within the EOP is to protect life and property, sustain survivors, repair essential facilities and utilities, and ensure continuity of governance and services. Because of the small size of the municipality and the lack of current personnel, Green Mountain Falls has an extremely limited capability to provide personnel resources with the exception of an Emergency Manager. The Town Marshal also acts as the Emergency Manager for the town.

Marshal

The Green Mountain Falls Marshal's Office provides law enforcement services to protect life and property for the community within the town limits. Currently, Green Mountain Falls employs one full-time Town Marshal and three reserve deputies. Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office, and the El Paso-Teller County 911 Authority.

Fire

The Green Mountain Falls/Chipita Park Fire Protection District services the Town of Green Mountain Falls and is based within the town boundaries. The District provides fire, rescue, and emergency medical services to protect life and property in Green Mountain Falls. It is considered a Special District with its own governing board. The Green Mountain Falls/Chipita Park Department has an ISO rating of six.

Public Works

The Green Mountain Falls Public Works Department ensures that the town streets are maintained. Roads in Green Mountain Falls are mainly gravel and therefore require grading on a regular basis. The department is also in charge of all snow removal in town. Currently, the town employs two people in this department.

Water and Wastewater

All water service within the town is provided through Colorado Springs Utilities. The town collects no fees for wastewater as individual septic systems are required. The Public Works Department works closely with Colorado Springs Utilities to ensure continuity of service.

3.1.23 CITY OF MANITOU SPRINGS

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the City of Manitou Springs.

The City of Manitou Springs was incorporated in 1876 at the foot of Pikes Peak and the start of Ute Pass. The current population is approximately 5,448[1] residents and the size of the City is about 3.5 square miles within the incorporated area. Manitou Springs is located at the confluence of three major drainage basins (Ruxton Creek, Fountain Creek, and Williams Canyon), which converge in the center of downtown. Additional creek/drainage routes within the City are:

- Sutherland Creek, which runs through the Crystal Hills neighborhood approximately along Crystal Park Road on the southeast side of the community, and
- Becker's Lane Drainage, which runs parallel to Becker's Lane out of Garden of the Gods in the northeast part of the City.

The City's governance and administration consists of a mayor and six council members elected by the citizens. The City employs a full-time City Administrator, Deputy City Administrator, City Clerk and Deputy City Clerk, Finance Director (with three employees), Planning Director (with two staff members), and a Public Works Director (with 17 full-time and seven part-time seasonal employees). The Public Services

[1] Source: Colorado State Demography Office estimate, February 13, 2020

Director is in charge of the City's streets, engineering, water and wastewater utilities, water treatment, stormwater management, and parks/buildings maintenance.

The City has multiple plans and functions in place that guide growth and development within the community, such as comprehensive zoning and subdivision regulations, as well as other development-related codes such as historic preservation and signage. Applicable codes/provisions related to hazard mitigation capabilities are noted as follows:

Manitou Springs Vision Forward Plan, 2012

Manitou Springs Rainbow Vision Comprehensive Plan was updated in 2012 through a citizen-led process. The current plan comprises the public outreach portion of any good plan (i.e. the vision), but does not contain the other elements (such as objectives and actions) necessary for a complete and functional comprehensive plan.

Plan Manitou – Community Master Plan & Hazard Mitigation Plan, 2017

The City developed Plan Manitou to expand on the vision and needs identified in the Vision Forward Plan in a more comprehensive manner, and initiate community dialogue regarding natural hazards and risks. The development of the Plan was prompted by major storm and flood events that impacted the community in 2013 and 2015, as well as the community's proximity to the 18,247 acre Waldo Canyon Fire of 2012. Hazard mitigation goals, policies, and actions are integrated within the various elements of the master plan.

Several main themes were identified by the project team responsible for the Plan through community outreach and initial stakeholder meetings which guided the team to shape the plan.

- Connect-the-dots between current and prior plans and studies.
- Identify priorities and establish a plan for action
- Clearly define roles and responsibilities within and between City staff, elected officials, boards and commissions, and community partners

The City of Manitou Springs conducted a Natural Hazard Risk Assessment and convened a Hazard Mitigation Planning Team in 2015 to identify all potential natural hazards affecting Manitou Springs and reach a conclusion on the greatest risks faced by the community. The HMP Team determined that flooding, geologic hazards, and wildfire are the natural hazards that pose the greatest risk to the City. Overall, 32 state and federal disasters were declared between 1965 and 2015, 11 of these disaster declarations were due to flooding, while 10 were due to wildfires in the region. To mitigate future potential disasters, a Hazard Mitigation Steering Committee (a subgroup of the HMP Team) developed a Natural Hazard Mitigation Strategy that includes 37 mitigation actions. Ten high priority actions were identified:

- 1st Tier
    - Community Wildfire Protection Plan
    - Water System Distribution Master Plan
- 2nd Tier

  - Floodplain Management and Permitting
  - Flood Control Master Plan
  - City Hall/Public Facilities Complex and Operations
- 3rd Tier
  - Bridge Inspections, Maintenance, and Rehabilitation
  - Formal Development Review Process
  - Firewise Communities Outreach Program
  - Flood Mitigation Techniques for Downtown Property Owners
  - Continuity of Operation Plan and Continuity of Government Plan

Nine of these actions are complete, ongoing, or underway. One action, floodplain management and permitting, has not been initiated. In 2019, the City adopted a Community Wildfire Protection Plan, a five-year plan, with specific goals and actions for the City's wildfire mitigation strategy and implementation activities. These wildfire mitigation actions will be incorporated into the overall hazard mitigation strategy.

Zoning Ordinance – Manitou Springs Municipal Code, Title 18, 2020

The Manitou Springs City Council recognizes community development is a dynamic process. In 2004, it initiated a complete revision of the Zoning Code, which was originally adopted on September 25, 1975 and further updated in subsequent years.

18.10.010 - Purpose. The City contains many unique natural resources and sensitive areas, including watercourses, wetlands, hillsides, forested areas, rock formations, and open space. Such areas contribute to the City's quality of life, but are vulnerable to natural hazards such as flooding, improper drainage, geologic hazards, steep slopes, and wildfire. These natural hazard risks and vulnerabilities are identified in the City's adopted Hazard Mitigation Plan. The purpose of the natural hazard risk reduction and mitigation standards is to avoid development on hazardous sites, or, when development may occur, to provide appropriate mitigation to protect the public health, safety, and welfare.

The Zoning Code contains a number of provisions relating to development in hillside areas, flood hazard areas, and areas sensitive to wildfires. In June 2019, the City adopted amendments to strengthen Zoning Code regulations to reduce and minimize natural hazard impacts posed by development. These included updated evaluation criteria and new Chapter 18.10, Natural Hazard Risk Reduction and Mitigation, with more extensive requirements for geologic hazard and wildfire risk assessments and mitigation.

In July 2020, the City's Planning Department initiated the process of a comprehensive Development Code update (Zoning and Subdivision codes) that is expected to extend through 2021.

Subdivision Ordinance – Manitou Springs Municipal Code, Title 16, 2020

The subdivision regulations were updated by the City in 2020. In June 2019, the City adopted amendments to strengthen and clarify regulations to reduce and minimize natural hazard risks.

16.04.040 Purpose. The purpose of these regulations is to promote the health, safety, and general welfare of the citizens of Manitou Springs, by:

A. Ensuring that land is subdivided correctly into lots that are of adequate size and configuration for the purpose for which they are intended to be used;
B. Providing that streets will be laid out in relation to existing streets or according to the vision plan of Manitou Springs and that said streets will be built to adequate construction standards;
C. Producing sound living environments with the necessary open spaces for people, traffic, utilities, public protection, light, air, recreation and other community facilities;
D. Implementing the vision plan of Manitou Springs;
E. Protecting the natural resources of the community; and
F. Encouraging imagination and innovation in the design of any subdivisions.

16.28 Uniform Street Standards. Standards for arterial, collector, residential, minor residential, hillside minor residential streets and alleys are provided in this section.

16.32.010 Requirements for drainage plans and reports submitted to the City of Manitou Springs. This section specifies the type and format of drainage information to be provided to the City by a registered engineer.

Buildings and Construction

The City of Manitou Springs contracts with the Pikes Peak Regional Building Department (PPRBD) for enforcement of the International Building Code and building permit services, including plan review and inspections and compliance with floodplain regulations. Prior to obtaining a building permit being from PPRBD, residents must submit a property involvement permit for City approval.

Local Emergency Operations Plan, 2016

1.1. Purpose. The purpose of the Manitou Springs Emergency Operations Plan is to provide general guidelines and principles for planning, managing, and coordinating the overall response and recovery activities of The City of Manitou Springs government before, during, and after major emergency and disaster events. It delineates the roles and responsibilities of City departments, outside agencies, and volunteer organizations expected to contribute to the protection of people and property. This Emergency Operations Plan was prepared under the Comprehensive Emergency Management Concept developed by FEMA to integrate the response of all available emergency management resources and increase the level of emergency preparedness in Manitou Springs. The Plan should be reviewed annually and updated as necessary.

2.5. Concept of Operations. If a disaster occurs within the City of Manitou Springs with little or no warning, immediate response by the City will be required. Only personnel trained in the prearranged plans and procedures will be prepared to make the coordinated efforts necessary to meet a threat of life and/or property. When response to a disaster exceeds the capabilities of Manitou Springs, emergency response agencies may request resources through mutual aid agreements (usually discipline specific, such as fire, law enforcement, emergency medical, or public works). All local governments and special districts within El Paso County are responsible for coordinating with one another and for providing mutual aid within their capabilities and according to established written agreements. When all local resources and mutual aid resources are exhausted, the City of Manitou Springs, through El Paso County, may request aid from the state. The Emergency Operations Plan is based on the concept that emergency response functions will

generally parallel the normal operations of all city departments. To the extent possible, the same personnel will be utilized in both cases. Those day-to-day functions which would not contribute to emergency operations may be suspended for the duration of the emergency and recovery period. Resources normally required for day-to-day operations may be redirected for accomplishment of emergency tasks.

The Disaster Mitigation Act of 2000 provided for new approaches and support for comprehensive hazard mitigation planning. One of the requirements of this Act was the development of a State Mitigation Plan as a condition of federal disaster assistance. It also established a new requirement for local government planning efforts. The following are identified hazards to the City of Manitou Springs:

Natural Hazards:

- Flash Flood
- Wildfire
- Severe Winter Storm
- Flood
- Tornado

Technological/Human-Caused:

- Hazardous Materials Releases
- Terrorism
- Civil Disturbances
- Major Power Outage

Police

The Manitou Springs Police Department provides law enforcement services to protect life and property for the community within the city limits. The city currently employs one full-time Police Chief, three Sergeants, 12 officers, and two administrative staff. Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office, and the El Paso-Teller County 911 Authority.

Fire

The City of Manitou Springs Volunteer Fire Department has six full and 14 part-time firefighters and 41 volunteers who respond to both medical and fire emergencies. All fire departments within El Paso County, as well as some in Elbert and Teller County have a Mutual Aid Agreement in place. This agreement was executed and signed by all departments in 2000. The City of Manitou Springs currently has an ISO rating of five. The City of Manitou Springs Volunteer Fire Department has an auto-aid agreement in place with the Crystal Park Volunteer Fire Department to deliver aid for all calls within the Crystal Park District. In addition, Crystal Park Volunteer Fire Department has an agreement in place with Th City of Manitou Springs Volunteer Fire Department to deliver aid for any fire calls in Manitou Springs. The Volunteer Fire Department provided disaster incident management as well.

Health and Safety – Manitou Springs Municipal Code, Title 6

<u>Chapter 6.16 Water – Streams.</u> This chapter contains prohibitions on dumping or accumulating trash or debris into the City's creeks and streams.

<u>Chapter 6.18 Watershed District.</u> This chapter provides protection of the City's watershed as it specifically relates to the mineral springs for which it is famous. The purpose of the Watershed District is the full

exercise of the powers of the City in maintaining and protecting Manitou Springs' historic mineral springs from injury and pollution as well as from activities that may create a hazard to health and water quality or a danger of pollution, or interfere with continuous recharge. This District is created under the authority granted in Section 31-15-707(1)(b) Colorado Revised Statutes, 1973, and other Colorado statutes. The City Council of the City of Manitou Springs, in public hearings on this Watershed District Ordinance, has found and concluded that the systems of aquifers, springs, wells, pipes, valves, faucets, and drains, which constitute the historic mineral springs, are a "waterworks." Further, this District and the following regulations are created for the purpose of protecting Manitou Springs' free-flowing springs only, and not for the purpose of regulating land use activities outside the corporate limits of Manitou Springs. The regulation of land use activities beyond the corporate limits of Manitou Springs within the Watershed District shall be and remain the responsibility of El Paso County and of the City of Colorado Springs, as the case may be, and nothing herein shall restrict or supersede other governmental land use approval authority. Manitou Springs' authority herein shall be for the purpose of reviewing and restricting any activity within the District which creates a foreseeable risk of damage or injury to Manitou Springs' historic springs. Manitou Springs' review authority within the District shall therefore be concurrent to the authority of said counties and/or City or any other government entity which require permits for the same activity as Manitou Springs may regulate.

Chapter 6.34 Restrictions on Open Fires and Open Burning. This chapter provides for the declaration of high fire danger and for the prohibition of certain outdoor burning when declared by the Fire Chief.

Chapter 6.36 Transportation of Flammable Liquids. This chapter contains the provisions and restrictions on the transport of flammable liquids by tank truck within the City.

Chapter 6.65 All-Hazards Pre-Disaster Mitigation Plan. This chapter adopts by reference the June 2008 version of the All-Hazards Pre-Disaster Mitigation Plan published by the El Paso County Office of Emergency Management.

Streets and Other Public Places – Manitou Springs Municipal Code, Title 12

Chapter 12.08 Excavations – Landfills. This chapter requires permits for excavation or filling activities and specifies permitting for work near or in drainage channels and waterways.

Utilities – Manitou Springs Municipal Code, Title 13

Chapter 13.36 Storm Water Utility. The purpose of this chapter is to promote the public health, safety and welfare by minimizing flood losses and damage from stormwater runoff; to establish a stormwater utility to coordinate, design, construct, manage, operate, and maintain the stormwater management system; to establish a program to finance stormwater management capital projects and operation, maintenance and administrative activities; and to encourage and facilitate the control of stormwater, to reduce pollution and to enhance the environment.

Stormwater Quality Management and Discharge Control Code – Manitou Springs Municipal Code, Title 14

The purpose and intent of this title is to protect the water quality of watercourses and water bodies in a manner pursuant to and consistent with the Federal Clean Water Act (33 U.S.C. Section 1251 et seq.) by

reducing pollutants in stormwater discharges to the maximum extent practicable and by prohibiting non-stormwater discharges into the City's Municipal Separate Storm Sewer System (MS4).

A. The objectives of this Code are as follows:

1. To promote, preserve, and enhance the natural resources within the City of Manitou Springs from adverse or undesirable impacts caused by development or other activities;
2. To protect and promote the health, safety, and welfare of the people and property through effective stormwater quality management practices;
3. To regulate land development activity, land disturbing activity, or other activities that may have an adverse impact on stormwater quality, and/or environmentally sensitive lands and to encourage compatibility between such uses;
4. To establish detailed review standards and procedures for land development activities throughout the City of Manitou Springs, thereby achieving a balance between growth and development and the protection of water quality; and
5. To provide for adequate stormwater system analysis and design as necessary to protect public and private property, water quality and existing natural resources.

B. This Code sets forth uniform requirements for Stormwater Management Systems within the City of Manitou Springs. In the event of any conflict between the City of Manitou Springs, El Paso County, State or Federal authorities, the more restrictive standard shall prevail.

C. This Code applies in the City of Manitou Springs, Colorado and to persons outside the City who are, by contract or agreement with the City, users of the City Stormwater Management System. Except as otherwise provided herein, the Stormwater Manager shall administer, implement, and enforce the provisions of this Code.

Public Works

The Public Works Department strives to make Manitou Springs a better place to live and work, while making customer service a priority. The Public Works Director reports to the City Administrator and oversees the department's 23 employees across six divisions and various initiatives:

- Parks and Recreation Division
- Facilities/Custodial Division
- Fleet Division
- Streets/Stormwater Division
- Water/Sewer Division
- Utilities Division
- Water Treatment Plant
- Capital Improvement Plan

Some of the Public Work's primary missions include:

- **Manitou Springs Reservoir**: The Manitou Springs reservoir and watershed area is nestled high up on Pikes Peak. This watershed occupies about 30 acres of United States Forest (Pikes Peak District) land, and the reservoir holds 720 acre-feet of water. The entire Manitou reservoir

watershed area is closed to recreational use. The City monitors the flows of incoming waters and releases from the reservoir, along with surrounding weather conditions that may affect the downstream areas. The State of Colorado Office of Dam Safety maintains an Emergency Action Plan for the reservoir. In 2014, the City adopted a Source Water Protection Plan for protection of the City's drinking water supply and infrastructure.

- **Streets/Stormwater Management: Streets/Stormwater management** provides routine maintenance and repair services for all street surfaces, storm drainage conduits, culverts, and ditches in Manitou Springs.

3.1.24 TOWN OF MONUMENT

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the Town of Monument.

The Town of Monument has multiple plans and functions in place that guide growth and development within the community. The Town staff includes the Town Manager, Town Clerk, Public Works Director, Planning Director, and the Chief of Police, all of whom have significant responsibility for the development and implementation of development plans, codes, and regulations in the Town. The Town's planning mechanisms include the following:

Monument Master Plan, 2017

The Town of Monument Comprehensive Plan was first adopted in 1984 and most recently updated 2017. In compliance with Colorado Law, the Comprehensive Plan is advisory and does not affect legally protected interests of property owners. It provides a framework that supports informed and consistent decision making by Town-elected officials, appointed officials and staff. The Comprehensive Plan also outlines principles and policies concerning land use, housing, parks, development, transportation, and other elements, as well as guides public investment and the provision of Public Works.

The Town of Monument Comprehensive Plan embodies policy and guiding principles for the community zoning ordinances, subdivision regulations, and capital improvement programs, then provides the detailed means of implementing those principles encompassing the following: land use; annexations; transportation system; economic development; housing; community character and design; historic preservation; parks and recreation; trails; visual resources; open space; public health and safety; services and utilities; intergovernmental collaboration; environmental; education; and downtown.

Monument Subdivision Regulations, 2014

The Monument Subdivision Regulations were enacted to promote the health, safety, convenience, prosperity, aesthetics, and general welfare of the citizens of the Town. The subdivision of land is the first step in the process of urban development. The arrangement of land parcels for residential, commercial, industrial, recreational, utility, and other public purposes will determine to a large degree the qualities of health, safety, convenience, environment, and general welfare of the Town.

Established standards of subdivision design will encourage the development of sound, economical, and stable neighborhoods; ensure a healthy living environment; and protect the natural environment. The following are currently administered regulations to ensure the desirable development of the community through the adherence to accepted principles of land use, intensity of development, distribution of

growth, preservation of natural amenities, and other elements of the Town's development plans. The standards are intended to prevent flood damage to persons and properties and minimize expenditures for flood control; restrict building on flood lands, shorelands, wetlands, areas covered by poor soils, or in areas otherwise poorly suited for building or construction; and prevent loss or injury from landslides, expansive soils, and other geological hazards.

Monument Master Drainage Plan, 2014

The Town of Monument Board of Trustees enacted the Town's stormwater drainage system impact fee regulations in 2000 based upon studies conducted by El Paso County, Colorado.

The regulations were adopted based on the following findings:

- Need for Capacity Expansion and Major Stormwater Drainage System Improvements: The future growth and new development in the Town (from 2000 forward) will require a substantial expansion and major improvements in stormwater drainage system facilities if adequate levels of service are to be maintained on the Town's major stormwater drainage system.
- Major Stormwater Drainage System Capital Improvement Project: In 2000, the Board of Trustees identified the improvements required to maintain adequate levels of service on the Town's major stormwater drainage system. The highest priority improvements that should be completed over the next several years (from 2000 forward) were listed, along with descriptions and cost estimates.
- Revenue Shortfall: In 2000, the Board of Trustees determined that revenue generated by new growth (from 2000 forward) and development under the Town's existing fiscal structure (in 2000) would not be adequate to fund the needed stormwater drainage system improvements necessary to accommodate the new growth and development if the desired levels of service on the Town's major stormwater drainage system were to be maintained.
- Proportionate Share Policy: In 2000, the Board of Trustees determined that future growth and new development (from 2000 forward) should contribute its proportionate share of the costs of providing such stormwater drainage system facilities to the Town's major stormwater drainage system.
- Stormwater Drainage System Impact Fee Preferred: In 2000, the Board of Trustees further determined that the imposition of a stormwater drainage system impact fee was one of the preferred methods of regulating new growth and development in the Town in order to ensure new growth and development bears a proportionate share of the costs of the stormwater drainage system facilities necessary to accommodate that new development and provide for the public health, safety, and welfare.
- Interim Impact Fee: In previous years, El Paso County, Colorado, conducted detailed studies of four of the five drainage basins traversing the Town and, pursuant to an extensive public review and hearing process, the County adopted a per impervious acre stormwater drainage impact fee for each of these basins applicable to unincorporated lands. As an interim measure pending completion of the development of (by system) a formal needs analysis, cost allocations to growth, and capacity data bases, the Board of Trustees determined it would be in the best interests of the Town to implement an interim stormwater drainage system impact

fee, based on El Paso County's drainage basin studies and consistent with the Town's drainage consultant's recommendations.

- Consistent with Master Plan. In 2000, it was determined a stormwater drainage system impact fee that contributes a proportionate share would assist in the implementation and be consistent with the Town's Master Plan.

Monument Stormwater Discharge And Erosion Control

The purpose of stormwater discharge and erosion control is to protect the public health, safety, and welfare of the citizens of Monument, to protect the public infrastructure, and to protect downstream environments from detrimental effects caused by illicit discharge, excessive stormwater runoff, and sedimentation by eliminating and controlling, to the maximum extent possible, sources of concentrated stormwater runoff from private property in excess of historical flows, volumes, and velocities; and by eliminating and controlling erosion, and the resulting migration of sediment and other debris at the source.

Emergency Watering Restrictions (Ord. 13.04.120)

Emergency watering restrictions prohibit specific outside uses of water during emergency situations except with special exceptions granted by either the Town Board, Town Manager, or his or her designee.

Emergency water restrictions can be declared by the Town board or any two of the following:

1. Mayor;
2. Director of Public Works or appointee;
3. Town manager or appointee.

An emergency water restriction may be imposed when the Town's storage tank reaches condition red and cannot be replenished within a reasonable period of time:

Condition red	=	Tank level is 0 to 9 feet
Condition yellow	=	Tank level is 9 to 12 feet
Condition green	=	Tank level is 12 to 18 feet

Notice of emergency water restrictions will include the following:

1. Notification of local radio and television stations
2. Posting on Town Website and other available forms of social media

Flood Ordinance, 20-02, 2002

The flood hazard areas of Monument are subject to periodic inundation which could result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which could adversely affect the public health, safety and general welfare. These flood losses could be caused by the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are

inadequately flood-proofed, elevated or otherwise protected from flood damage also contribute to the flood loss. It is the purpose of the flood regulations to promote the public health, safety, and general welfare, and to minimize public and private losses caused by flood conditions in specific areas.

Planning Department

The Planning Department offers information and assistance in directing the land development entitlement process for the Town. The Planning Department offers assistance from the time of application through record of applicable plans and documents to include, but not limited to: plan review, processing of development permits, preparation of staff reports, compilation of data and drafting of documentation relative to long-range planning projects, urban planning and redevelopment functions, and Comprehensive Plan, Subdivision and Zoning Code revisions.

The mission of the department is to conduct plan review and inspect public and private improvements to ensure compliance with approved construction drawings, monthly and event-based stormwater inspections on all active construction sites and to provide recommendations for non-compliant projects to ensure the health, welfare and safety of the citizens of Monument as well as maintain aesthetics within Town boundaries.

Building and Code Enforcement/Project Management Department

The mission of the Building and Code Enforcement/Project Management Department is to conduct plan review and inspect public and private improvements to ensure compliance with approved construction drawings, monthly and event-based stormwater inspections on all active construction sites and to provide recommendations for non-compliant projects to ensure the health, welfare and safety of the citizens of Monument as well as maintain aesthetics within Town boundaries. The Code Enforcement Officer performs enforcement of municipal ordinances as needed, with a primary focus on the immediate public safety and health of the residents of the Town of Monument.

Monument Emergency Operations Plan, 2021 (Draft)

The Town of Monument is working in conjunction with the PPROEM on an EOP. The ability to respond to a man-made or natural disaster is a necessary function of government. Common to all emergency situations are functions that require the protection of life and property. Specifically, these functions include planning and identification of responsibilities, warning and evacuation, communication, direction and control, public information, resource management, damage assessment, emergency health and medical services, and sheltering.

Purpose

The primary emphasis of the Town of Monument EOP is on town government responsibilities and functions, public warning, direction and coordination. The purpose of the Town of Monument EOP is to provide general guidelines and principles for planning, managing and coordinating the overall response and recovery activities of town departments, and participating agencies to be used before, during, and after the limited timeframe of a threatened, imminent, or actual major emergency or disaster.

Major emergencies and disasters are unique events that present communities and emergency personnel with extraordinary problems and challenges that cannot be adequately addressed within the routine operations of local government. Since disasters differ in important ways and it is impossible to plan for every contingency, highly detailed operational procedures are avoided in the plan in favor of a streamlined all-hazard preparedness approach. This plan is intended to provide town officials and participating agencies the basis for the coordinated management of disaster incidents so that impacts to people, property, public services and economy are minimized and so that normal community conditions can be restored as quickly as possible.

All town departments are responsible for developing and maintaining up-to-date internal plans and procedures for carrying out assigned emergency functions and for ensuring that their personnel are adequately trained. The coordination and integration of emergency plans and procedures is an ongoing process that should be promoted by convening town department/agency meetings, developing mutual aid agreements and by conducting inter-jurisdictional exercises.

Town of Monument Comprehensive Plan (2017)

The intent of the Town of Monument Comprehensive Plan is to provide a tool to be used by the community for decision making, steer development in a positive direction, and ensure development supports the community. The Plan is intended to provide guidance for decision making regarding community character, infrastructure improvements, land use, and the review of development proposals.

Police

The Police Department protects the community and provides law enforcement services to protect life and property in the following areas:

- Patrol Division: covers 7 days a week, 24 hours a day. Officers respond to emergency and non-emergency calls for service. They strive to work in partnership with our community in seeking out and solving problems in order to maintain the peace, prevent crime, and to enhance the safety for all of our citizens.
- Investigations: One detective is assigned full time to the Investigations Unit to investigate major crimes such as sexual assault, robberies, burglaries, felony thefts, narcotics investigations, and any other crime which requires additional resources and expertise.
- Community Resource Officer: One officer is assigned, on a part-time basis, to interact with businesses, schools, and citizens. The Community Resource Officer provides high visibility and recognizable response to day-to-day issues surrounding the school and community environment.
- S.W.A.T. Team: 6 members of the Monument Police Department are part of a combined Special Weapons and Tactics (S.W.A.T.) team comprised of members from two different police departments. The S.W.A.T. team provides a higher level of specialized tactics and capabilities to address higher risk situations than can be handled at the patrol level.
- Community Resources: The Monument Police Department is a full-service organization that offers citizens additional opportunities and programs designed to further cooperation between the police department and the citizens. The ultimate goal is to keep our community

safe. Community Resources include, but are not limited to Neighborhood Watch, Business Watch, Citizens Police Academy, Scout Tours, and Safety Bulletins.

Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office, and the El Paso-Teller County 911 Authority.

Fire

The Town of Monument is part of the Tri-Lakes Monument Fire Protection District. The mission of the Tri-Lakes Monument Fire Protection District is to minimize the loss of life and property resulting from fires, medical emergencies, environmental and other disasters. That mission is accomplished through a progressive and professional system of personnel development, public education, fire suppression, code enforcement, medical services and rescue skills, as well as aggressive community involvement.

Home fire safety inspections and FireWise property inspections are conducted free of charge. These inspections consist of an assessment of the home and property with relation to wildland fire threats. Wildfire is a growing threat in the Rocky Mountain region. Homeowners need to be aware of the importance of mitigating wildfire hazards and be aware of the impact of living in high-risks area. The Tri-Lakes Monument Fire Protection District follows guidelines for the FireWise Program. The FireWise Program shows homeowners how to mitigate their property and reduce the risk of a wildfire.

All new one- and two-family homes are required to have smoke alarms and carbon monoxide alarms installed. Smoke alarms must be installed in each sleeping room and outside of each bedroom in the hallway/room. Each floor must have at least one smoke alarm, regardless of bedrooms. Effective 2006, carbon monoxide detectors are required in new homes or rental homes.

Public Works

The Monument Public Works Department includes streets, parks and cemetery divisions.

The Streets Division is responsible for maintaining and preserving the Town's roadway and drainage infrastructure which includes but is not limited to the following: snow plowing roadways; street sweeping; patching and resurfacing roadways; and storm drainage system maintenance. The Streets Division also includes Fleet Management, which is responsible for preventive maintenance and emergency repairs on all equipment to minimize equipment down time.

The Parks and Open Space Division has many responsibilities that include management, maintenance, and the protection of the natural resources within parks and open space properties. Division staff also repair, monitor, and renovate irrigation, lighting, and plumbing systems; maintain, renovate, and construct buildings, structures, walkways, curbing, parking facilities, and fences; and repair all manner of vandalized facilities.

Water and Wastewater

The Monument Public Works Department also includes the Water Department. The Water Department is responsible for operating and maintaining the town's nine water wells, treatment facilities, distribution system, and the management of water treatment chemicals with constant monitoring and testing for

water quality. The Town of Monument does not have a Wastewater Department. This function covered by the Monument Sanitation District.

3.1.25 TOWN OF PALMER LAKE

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the Town of Palmer Lake.

The Town of Palmer Lake has multiple plans and functions in place that guide growth and development within the community. The Town is governed by the Board of Trustees and staff positions that include the Town Administrator/Town Clerk, Deputy Clerk, Water Supervisor, Roads Supervisor, Fire Chief, and a Police Chief who have significant responsibility for the development and implementation of development plans, codes and regulations in the Town.

Town of Palmer Lake Master Plan, 2013

The Town of Palmer Lake Comprehensive Plan was first adopted in March of 1993. In compliance with Colorado Law, the Comprehensive Plan was reviewed, amended, and approved by the Town Council in September 2013. The plan encompasses the following:

- Natural Environment
- Physical and Community Services
- Land Use
- Downtown Design Plan
- Infrastructure Recommendations
- Administration and Implementation Program

This plan is only to be used as advisory and does not affect legally protected interests of property owners.

The Palmer Lake Vision: The citizens of Palmer Lake want a town that provides the traditional public services while maintaining its historical, small-town atmosphere. They accept the fact that in order to preserve this atmosphere, they may not, in the near future, be able to have all the amenities of larger more industrial-based municipalities, such as all paved streets.

Palmer Lake Subdivision Regulations, 2004

The Palmer Lake Subdivision Regulations were developed to promote the health, safety, convenience and general welfare of the citizens of Palmer Lake.

Palmer Lake Building and Code Enforcement

The Town of Palmer Lake does not have a building inspector, but contracts with PPRBD. PPRBD's main goal is to safeguard life and limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, as well as use and occupancy of all buildings and structures within Palmer Lake. This is accomplished through the enforcement of minimum building code standards. Also, the building department performs comprehensive inspections of alterations and additions to all buildings to ascertain compliance with numerous building codes. The Town Clerk and Deputy Clerk review all plans to insure current zoning requirements have been met.

Local Emergency Operations Plan, 2012

A function of government is to protect life and property. Equally important is the public's obligation to be informed, take a community interest, and assist when possible. This plan encourages citizens to review and discuss the plan with family and friends. As a minimum, citizens should know the hazards in the community and have a plan for themselves and their family.

Police Department

The Palmer Lake Police Department protects the community and provides law enforcement services to protect life and property. The Police Department consists of a Police Chief, 2 Sergeant's, 7 part-time officers, a code enforcement officer, and 5 reserve officers. Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office and the EL Paso-Teller County 911 Authority.

Fire Department

The Town of Palmer Lake Fire Department has a staff that operates 24 hours a day, seven days a week. Led by a full-time Fire Chief/Paramedic working Monday-Friday 8 am – 4 pm. The daily staffing includes a company officer (Captain or Lieutenant) working a 48/96 hour schedule. Part-time engineers and a cadre of 10 volunteers fill out the remaining positions on a shift. All paid members are certified to NFPA 1001 Fire Fighter I, and the EMT-B level, at a minimum. Palmer Lake enjoys the benefits of a robust Mutual Aid Agreement through El Paso County and the 'North Group' (Donald Wescott, Air Force Academy, Tri-Lakes Monument, Black Forest, and Larkspur).

Public Works Department

The Streets Division is responsible for maintaining and preserving the Town's roadway and drainage infrastructure which includes, but is not limited to the following:

- Snowplowing roadways
- Street sweeping
- Patching and resurfacing roadways
- Storm drainage system maintenance.

Palmer Lake Water Department

The Town's Water Department responsibilities include, but are not limited to the following:

- Operating and maintaining the town's two water wells and treatment facilities
- Management of water treatment chemicals and constant monitoring and testing for water quality
- Operating and maintaining the Town's water distribution system comprised of underground piping, fire hydrants, booster pumps, and the storage tanks
- 1 surface treatment plant
- 1 ground water treatment plant

3.1.26 TOWN OF RAMAH

Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities within the Town of Ramah.

The Town of Ramah's governance and administration consists of a Board of Trustees elected by the citizens and a part-time Town Clerk. The Town of Ramah currently has no master plan, zoning ordinances, or subdivision ordinances. The current population is approximately 130 residents. Growth management has not been an issue for at least the last 25 years and is not anticipated to be over the next decade. Ramah was previously a sizable small town with a railroad, banks, gas stations, and other stores. When the railroad discontinued use of the line, the town saw a considerable decline. There are no current economic development plans or capital improvement plans in place. The current Board of Trustees is actively looking toward the future by seeking out various grant opportunities to update infrastructure.

Flood Ordinance, 2014 (ORDINANCE NO. 2014-02)

Purpose. It is the purpose of this Article to promote the public health, safety, and welfare by provisions designed to:

(1) Protect human life and health;
(2) Minimize expenditure of public funds for costly flood control projects;
(3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
(4) Minimize prolonged business interruptions caused by flooding;
(5) Minimize damage to critical facilities, infrastructure and other public facilities such as water, sewer, and gas mains; electric and communications stations; and streets and bridges located in floodplains;
(6) Maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and
(7) Ensure that potential buyers are notified that property is located in a flood hazard area.

Building and Code Enforcement

The Town of Ramah employs a part-time building inspector to handle any new structures, as well as improvements to existing buildings. There has been very little new construction or significant structural improvement, such as new outbuildings, over the past five years. The town follows the International Residential Code for new structures, but almost every building in town is "grandfathered in" from prior building regulations. Code enforcement is minimal as Ramah has no local police force. El Paso County Sheriff's Office provides law enforcement for the town; however, code enforcement is not included with their coverage at this time.

Police

El Paso County Sheriff's Office provides law enforcement for the town. Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office, and the El Paso-Teller County 911 Authority.

Fire

The Town of Ramah is part of the Big Sandy Fire Protection District based out of Simla, Colorado in Elbert County. Ramah currently has an ISO rating of seven. The Fire Department is very active within the community and has specifically sought to increase the capabilities of the department through grant opportunities and funding from an adopted property tax assessment. The Calhan Fire Department also partners with the Big Sandy Fire to ensure all emergencies are handled in a timely manner.

Public Works

The Public Works Department consists of two part-time employees that handle town roads, parks, the cemetery, as well as water and sewer services. The town has been moving forward with efforts to pave all unpaved streets within town with the help of Community Development Block Grants. The grant program has also assisted with needed improvements to the water and sewer systems. Ramah will continue to improve infrastructure with funding from the Pikes Peak Rural Transportation Authority.

Water and Wastewater

The Public Works Department handles all aspects for the water and wastewater system. The town is supplied with two deep wells that provide potable water for the residents, and one alluvial well for non-potable use. The town is responsible for the safety, protection, and maintenance of both water and wastewater systems within town boundaries. Current objectives include: replacing old mains; maintaining the current system through proactive projects; finding and exercising water valves; start an on-going inspection program of the water tank; and scheduled cleaning of the septic system. The Town of Ramah is also researching the potential for an Intergovernmental Agreement with the Towns of Calhan and Simla for emergency water supplies.

3.2 HAZARD MITIGATION CAPABILITIES ASSESSMENT

The capability assessment conducted by the planning team included an inventory and analysis of existing authorities and capabilities. The assessment created an inventory of an agency's mission, programs and policies, and evaluates its capacity to carry them out.

Participating jurisdictions were asked to review and provide updates to their associated capability matrices.

3.2.1 EL PASO COUNTY

3.2.1.1 Legal and Regulatory Capabilities

Table 3-8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in El Paso County.

3.2.1.2 Administrative and Technical Capabilities

Table 3-9 identifies the County personnel responsible for activities related to mitigation and loss prevention in El Paso County.

3.2.1.3 Financial Capabilities

Table 3-10 identifies financial tools or resources that El Paso County could use to help fund mitigation activities.

3.2.1.4 Education and Outreach Capabilities

Table 3-11 identifies Education and Outreach programs that El Paso County could use to help residents reduce their hazard risk.

Table 3-8: El Paso County Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	Policy Plan (1998) Small-Area Plans (Various Dates) (in planning process for new countywide Master Plan)
Zoning ordinance	YES	Regulations not Ordinance (2018)
Subdivision ordinance	YES	Regulations not Ordinance (2018)
Growth management	NO	
Floodplain ordinance	YES	Section Rbc313 - Floodplain Code (2017)
Other special purpose ordinance (stormwater, steep slope, wildfire)	YES	Emergency Watershed Protection Ordinance 07-03: Prohibition of Illicit Discharges into El Paso County Storm Water System
Building code	YES	Pikes Peak Regional Building Code, 2017 Edition (IRC 2015)
Fire department ISO rating	YES	Individual fire departments and fire protection districts are rated separately
Erosion or sediment control program	YES	Permitting process for construction over 1 acre defined in Engineering Criteria Manual Ch 5 & App I
Stormwater management	YES	Drainage Criteria Manual Vol I & II (2019)
Site plan review requirements	YES	El Paso County Land Development Code (2018)
Capital improvements plan	YES	PPRTA
Economic development plan	NO	No dedicated Community Economic Development Plan per se, but there are economic development items in the overall EPC County Strategic Plan.
Local emergency operations plan	YES	El Paso County Emergency Operations Plan, 2020
Other special plans	NO	
Flood insurance study or other engineering study for streams	YES	Flood Insurance Study2018 per https://coloradohazardmapping.com/riskMap/elPasoFirm & Floodplain Map, 2018
Elevation certificates	YES	Pikes Peak Regional Building Department

Table 3-8: El Paso County Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Rating System	YES	Rating 7
National Flood Insurance Program	YES	
Community Wildfire Protection Plan	YES	2011
BCEGS Rating	YES	Residential 3, Commercial/Industrial 2

Table 3-9: El Paso County Administrative/Technical Mitigation Capabilities Matrix

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	YES	Development Services Department
Engineer/professional trained in construction practices related to buildings and/or infrastructure	YES	Pikes Peak Regional Building Department and Development Services Department and Public Services Department
Planner/engineer/scientist with an understanding of natural hazards	YES	Development Services Department
Resiliency Planner	NO	
Transportation Planner	YES	Department of Public Works
Personnel skilled in GIS	YES	El Paso County IT-GIS Services
Full-time building official	YES	Pikes Peak Regional Building Department
Floodplain manager	YES	Pikes Peak Regional Building Department
Emergency manager	YES	PPROEM
Grant writer	YES	El Paso County Sheriff-ESD/Comptroller, PPROEM
Other personnel	YES	El Paso County Sheriff-ESD/Prep. Planner (x3), PPROEM
GIS data: Hazard areas	YES	El Paso County IT-GIS Services
GIS data: Critical facilities	YES	El Paso County IT-GIS Services
GIS data: Building footprints	YES	El Paso County IT-GIS Services
GIS data: Land use	YES	El Paso County IT-GIS Services
GIS data: Links to Assessor's data	YES	El Paso County IT-GIS Services
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS

Table 3-9: El Paso County Administrative/Technical Mitigation Capabilities Matrix		
Personnel Resources	Yes/No	Department/Position
Other	YES	El Paso County Public Health/Environmental

Table 3-10: El Paso County Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES, If Voter Approved
Fees for water, sewer, gas, or electric services	NO
Impact fees for new development	YES
Incur debt through general obligation bonds	YES, If Voter Approved
Incur debt through special tax bonds	YES, Short Term
Incur debt through private activities	YES
Withhold spending in hazard prone areas	YES
Stormwater service fees	YES, Drainage Basin Fee
Other	NO

Table 3-11: El Paso County Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	YES
Firewise	YES
StormReady	YES
Other	YES

3.2.2 TOWN OF CALHAN

3.2.2.1 Legal and Regulatory Capabilities

Table 3-12 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Calhan.

3.2.2.2 Administrative and Technical Capabilities

Table 3-13 identifies the Town personnel responsible for activities related to mitigation and loss prevention in Calhan.

3.2.2.3 Financial Capabilities

Table 3-14 identifies financial tools or resources that Calhan could use to help fund mitigation activities.

3.2.2.4 Education and Outreach Capabilities

Table 3-15 identifies Education and Outreach programs that Calhan could use to help residents reduce their hazard risk.

Table 3-12: Calhan Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	Comprehensive plan adopted in 2002
Zoning ordinance	YES	Only 2 items (marijuana & camping) – town is not zoned
Subdivision ordinance	YES	
Growth management	NO	
Floodplain ordinance	YES	Adopted per State recommendations
Other special purpose ordinance (stormwater, steep slope, wildfire)	NO	
Building code	YES	IRC 2006
Fire department ISO rating	YES	Rated 6
Erosion or sediment control program	NO	
Stormwater management	NO	
Site plan review requirements	YES	Within building codes
Capital improvements plan	NO	
Economic development plan	NO	
Local emergency operations plan	YES	
Other special plans	NO	
Flood insurance study or other engineering study for streams	YES	2018 FIS
Elevation certificates	NO	

Table 3-12: Calhan Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Rating System	NO	
National Flood Insurance Program	YES	
Community Wildfire Protection Plan	NO	
BCEGS Rating	YES	Residential 3, Commercial/Industrial 2

Table 3-13: Calhan Administrative/Technical Mitigation Capabilities Matrix		
Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	NO	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	NO	
Planner/engineer/scientist with an understanding of natural hazards	NO	
Resiliency Planner	YES	Part-time town clerk and fire chief
Transportation Planner	YES	
Personnel skilled in GIS	NO	Under the Purview of El Paso County GIS Services
Full-time building official	NO	Part-time
Floodplain manager	NO	Town Board
Emergency manager	YES	Fire Chief
Grant writer	NO	
Other personnel	YES	Part-time building official, engineer hired for projects
GIS data: Hazard areas	NO	Under the Purview of El Paso County GIS Services
GIS data: Critical facilities	NO	Under the Purview of El Paso County GIS Services
GIS data: Building footprints	NO	Under the Purview of El Paso County GIS Services
GIS data: Land use	NO	Under the Purview of El Paso County GIS Services
GIS data: Links to Assessor's data	NO	Under the Purview of El Paso County GIS Services
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS
Other	NO	

Table 3-14: Calhan Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES
Fees for water, sewer, gas, or electric services	YES
Impact fees for new development	NO
Incur debt through general obligation bonds	YES, If Voter Approved
Incur debt through special tax bonds	NO
Incur debt through private activities	NO
Withhold spending in hazard prone areas	NO
Stormwater service fees	NO
Other	NO

Table 3-15: Calhan Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	NO
Firewise	NO
StormReady	NO
Other	NO

3.2.3 CITY OF COLORADO SPRINGS

3.2.3.1 Legal and Regulatory Capabilities

Table 3-16 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Colorado Springs.

3.2.3.2 Administrative and Technical Capabilities

Table 3-17 identifies the City personnel responsible for activities related to mitigation and loss prevention in Colorado Springs.

3.2.3.3 Financial Capabilities

Table 3-18 identifies financial tools or resources that Colorado Springs could use to help fund mitigation activities.

3.2.3.4 Education and Outreach Capabilities

Table 3-19 identifies Education and Outreach programs that Colorado Springs could use to help residents reduce their hazard risk.

Table 3-16: Colorado Springs Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	PlanCOS, 2019
Zoning ordinance	YES	
Subdivision ordinance	YES	Chapter 7 of the Code of Ordinances is both the Zoning and Subdivision Ordinance
Growth management	NO	
Floodplain ordinance	YES	
Other special purpose ordinance (stormwater, steep slope, wildfire)	YES	Hillside and streamside zoning overlays; geohazard ordnance
Building code	YES	Pikes Peak Regional Building Code, 2017 Edition (IRC 2015) – part-time building inspector
Fire department ISO rating	YES	Rated 7
Erosion or sediment control program	YES	
Stormwater management	YES	City of Colorado Springs Drainage Criteria Manual (DCM)
Site plan review requirements	YES	
Capital improvements plan	NO	
Economic development plan	YES	Includes Urban Renewal Plan
Local emergency operations plan	YES	
Other special plans	YES	
Flood insurance study or other engineering study for streams	YES	
Elevation certificates	YES	
Community Rating System	YES	Rated 5
National Flood Insurance Program	YES	

Table 3-16: Colorado Springs Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Community Wildfire Protection Plan	YES	2011
BCEGS Rating		Residential 3, Commercial/Industrial 2

Table 3-17: Colorado Springs Administrative/Technical Mitigation Capabilities Matrix		
Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	YES	Planning and Development
Engineer/professional trained in construction practices related to buildings and/or infrastructure	YES	Pikes Peak Regional Building Department, Planning and Development Department, and Public Works
Planner/engineer/scientist with an understanding of natural hazards	YES	Planning and Development Department and Public Works
Resiliency Planner	NO	
Transportation Planner	YES	Planning and Development Department and Public Works
Personnel skilled in GIS	YES	IT GIS Division and Departmental Users
Full-time building official	YES	
Floodplain manager	YES	Under the purview of the County Floodplain Manager
Emergency manager	YES	PPROEM
Grant writer	YES	City Finance
Other personnel	YES	Quality of Life Team
GIS data: Hazard areas	YES	
GIS data: Critical facilities	NO	
GIS data: Building footprints	YES	
GIS data: Land use	YES	
GIS data: Links to Assessor's data	YES	
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	
Other	NO	

Table 3-18: Colorado Springs Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES

Table 3-18: Colorado Springs Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES/Subject to Voter Approval
Fees for water, sewer, gas, or electric services	YES/With Enterprise
Impact fees for new development	Limited
Incur debt through general obligation bonds	YES/Subject to Voter Approval
Incur debt through special tax bonds	YES/Subject to Voter Approval
Incur debt through private activities	YES
Withhold spending in hazard prone areas	YES/Subject to Legal Limits
Stormwater service fees	YES
Other	YES

Table 3-19: Colorado Springs Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	YES
Firewise	YES
StormReady	YES
Other	YES

3.2.4 CITY OF FOUNTAIN

3.2.4.1 Legal and Regulatory Capabilities

Table 3-20 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Fountain.

3.2.4.2 Administrative and Technical Capabilities

Table 3-21 identifies the City personnel responsible for activities related to mitigation and loss prevention in Fountain.

3.2.4.3 Financial Capabilities

Table 3-22 identifies financial tools or resources that Fountain could use to help fund mitigation activities.

3.2.4.4 Education and Outreach Capabilities

Table 3-23 identifies Education and Outreach programs that Fountain could use to help residents reduce their hazard risk.

Table 3-20: Fountain Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	The City adopted a major update to its Comprehensive Development Plan in 2005. The Plan is an advisory guide to land use decisions in the community. In 2009, the City adopted a Strategic Plan, which provides a framework for rational decision making.
Zoning ordinance	YES	Last major update to the Zoning Ordinance was approved by the City in 2020.
Subdivision ordinance	YES	A major update to the Subdivision Regulations was approved by the City in 2008 with a few minor updates since then.
Growth management	YES	Growth management strategies and policies are incorporated in the Comprehensive Development Plan.
Floodplain ordinance	YES	
Other special purpose ordinance (stormwater, steep slope, wildfire)	NO	
Building code	YES	2017 Edition of the Pikes Peak Regional Building Code As Amended and all code referred to within. 2015 Edition of the International Fire Code with appendices and amendments.
Fire department ISO rating	YES	
Erosion or sediment control program	YES	Public Works Director/City Engineer
Stormwater management	YES	Public Works Director/City Engineer
Site plan review requirements	YES	2020 Zoning Ordinance, as amended.
Capital improvements plan	YES	Public Works Director/City Engineer
Economic development plan	YES	Adopted by City in 2009
Local emergency operations plan	YES	
Other special plans	NO	
Flood insurance study or other engineering study for streams	YES	City is enrolled in the National Flood Insurance Program. A Flood Insurance Study was conducted by FEMA and Flood Insurance Rate Maps (FIRM) were prepared. A Master Development Drainage Plan for the Jimmy Camp Creek Drainage Basin has been developed and adopted by the City.
Elevation certificates	YES	Public Works Director/City Engineer
Community Rating System	YES	Rating 7

Table 3-20: Fountain Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
National Flood Insurance Program	YES	
Community Wildfire Protection Plan	NO	
BCEGS Rating	YES	Residential 3, Commercial/Industrial 2

Table 3-21: Fountain Administrative/Technical Mitigation Capabilities Matrix

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	YES	Planning Division of the Community Services Department and Engineering Division of the Public Works Department
Engineer/professional trained in construction practices related to buildings and/or infrastructure	YES	Public Works Director/City Engineer
Planner/engineer/scientist with an understanding of natural hazards	YES	Planning Division of the Community Services Department and Engineering Division of the Public Works Department
Resiliency Planner	NO	
Transportation Planner	NO	
Personnel skilled in GIS	YES	
Full-time building official	YES	Under the purview of PPRBD
Floodplain manager	YES	Under the purview of PPRBD
Emergency manager	YES	
Grant writer	YES	
Other personnel	NO	
GIS data: Hazard areas	NO	
GIS data: Critical facilities	YES	Limited
GIS data: Building footprints	YES	
GIS data: Land use	YES	
GIS data: Links to Assessor's data	NO	
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS
Other	NO	

Table 3-22: Fountain Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES
Fees for water, sewer, gas, or electric services	YES
Impact fees for new development	YES
Incur debt through general obligation bonds	YES
Incur debt through special tax bonds	YES
Incur debt through private activities	NO
Withhold spending in hazard prone areas	NO
Stormwater service fees	YES
Other	NO

Table 3-23: Fountain Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	NO
Firewise	NO
StormReady	NO
Other	NO

3.2.5 TOWN OF GREEN MOUNTAIN FALLS

3.2.5.1 Legal and Regulatory Capabilities

Table 3-24 lists regulatory and planning tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Green Mountain Falls.

3.2.5.2 Administrative and Technical Capabilities

Table 3-25 identifies the Town personnel responsible for activities related to mitigation and loss prevention in Green Mountain Falls.

3.2.5.3 Financial Capabilities

Table 3-26 identifies financial tools or resources that Green Mountain Falls could use to help fund mitigation activities.

3.2.5.4 Education and Outreach Capabilities

table 3-27 identifies Education and Outreach programs that Green Mountain Falls could use to help residents reduce their hazard risk.

Table 3-24: Green Mountain Falls Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	Town has a Comprehensive Plan developed in 2019
Zoning ordinance	YES	
Subdivision ordinance	NO	
Growth management ordinance	YES	Limited by terrain
Floodplain ordinance	YES	Through Regional Building El Paso County
Other special purpose ordinance (stormwater, steep slope, wildfire)	YES	Wildfire Ordinance
Building code	YES	Through Regional Building
Fire department ISO rating	N/A	Fire Protection District services
Erosion or sediment control program	NO	
Stormwater management	NO	
Site plan review requirements	NO	
Capital improvements plan	NO	
Economic development plan	NO	
Local emergency operations plan	YES	
Other special plans		
Flood insurance study or other engineering study for streams	NO	
Elevation certificates	YES	Under the purview of PPRBD
Community Rating System	YES	Rating 7
National Flood Insurance Program	YES	
Community Wildfire Protection Plan	NO	
BCEGS Rating	YES	Residential 3, Commercial/Industrial 2

Table 3-25: Green Mountain Falls Administrative/Technical Mitigation Capabilities Matrix

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	YES	Planning Department
Engineer/professional trained in construction practices related to buildings and/or infrastructure	NO	
Planner/engineer/scientist with an understanding of natural hazards	NO	
Resiliency Planner	NO	
Transportation Planner	YES	Part-time consultant
Personnel skilled in GIS	NO	Under the Purview of El Paso County GIS Services
Full-time building official	YES	Under the purview of PPRBD
Floodplain manager	YES	Under the purview of PPRBD
Emergency manager	YES	Town Marshal
Grant writer	YES	Town Manager
Other personnel	NO	
GIS data: Hazard areas	NO	Under the Purview of El Paso County GIS Services
GIS data: Critical facilities	NO	Under the Purview of El Paso County GIS Services
GIS data: Building footprints	NO	Under the Purview of El Paso County GIS Services
GIS data: Land use	NO	Under the Purview of El Paso County GIS Services
GIS data: Links to Assessor's data	NO	Under the Purview of El Paso County GIS Services
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS
Other	NO	We are a very small municipality with limited resources including personnel to administer these services.

Table 3-26: Green Mountain Falls Financial Mitigation Capabilities Matrix

Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES
Fees for water, sewer, gas, or electric services	NO – all through Colorado Springs Utilities/ Gas company
Impact fees for new development	NO
Incur debt through general obligation bonds	NO

Table 3-26: Green Mountain Falls Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Incur debt through special tax bonds	YES
Incur debt through private activities	NO
Withhold spending in hazard prone areas	NO
Stormwater service fees	NO
Other	NO

Table 3-27: Green Mountain Falls Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	NO
Firewise	NO
StormReady	NO
Other	NO

3.2.6 CITY OF MANITOU SPRINGS

3.2.6.1 Legal and Regulatory Capabilities

Table 3-28 lists regulatory and planning tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Manitou Springs.

3.2.6.2 Administrative and Technical Capabilities

Table 3-29 identifies the City personnel responsible for activities related to mitigation and loss prevention in Manitou Springs.

3.2.6.3 Financial Capabilities

Table 3-30 identifies financial tools or resources that Manitou Springs could use to help fund mitigation activities.

3.2.6.4 Education and Outreach Capabilities

Table 3-31 identifies Education and Outreach programs that Manitou Springs could use to help residents reduce their hazard risk.

Table 3-28: Manitou Springs Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	Emergency Operation Plan, Historic Bridges and Walls Assessment report, Historic District Design Guidelines
Zoning ordinance	YES	
Subdivision ordinance	YES	
Growth management ordinance	NO	
Floodplain ordinance	YES	County Flood Plain Management
Other special purpose ordinance (stormwater, steep slope, wildfire)	YES	Stormwater, Drinking water.
Building code	YES	PPRBD
Fire department ISO rating	YES	5
Erosion or sediment control program	YES	Ongoing mitigation work Williams Canyon and Fountain Creek
Stormwater management	YES	
Site plan review requirements	YES	
Capital improvements plan	YES	
Economic development plan	YES	Economic Consolidation Project 2010, Urban renewal Plan
Local emergency operations plan	YES	Updated 2016
Other special plans	YES	Open Space Plan, Transportation and Mobility Master Plan, Flood Control Master Plan, Manitou Springs Integrated Comprehensive Plan and Hazard Mitigation Plan
Flood insurance study or other engineering study for streams	YES	2014
Elevation certificates	YES	
Community Rating System	YES	Rating 7
National Flood Insurance program	YES	
Community Wildfire Protection Plan	YES	2019
BCEGS rating	YES	Residential 3, Commercial/Industrial 2

Table 3-29: Manitou Springs Administrative/Technical Mitigation Capabilities Matrix

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	YES	Planning Department
Engineer/professional trained in construction practices related to buildings and/or infrastructure	YES	PPRBD
Planner/engineer/scientist with an understanding of natural hazards	YES	Public Works, Planning Department
Resiliency Planner	YES	Part-time staff member, Planning Department
Transportation Planner	YES	City Engineer accomplishes this as an additional duty
Personnel skilled in GIS	YES	Public Works, Planning Department
Full-time building official	YES	Under the purview of PPRBD
Floodplain manager	YES	Under the purview of PPRBD
Emergency manager	YES	Fire Department
Grant writer	YES	
Other personnel	NO	
GIS data: Hazard areas	NO	
GIS data: Critical facilities	YES	
GIS data: Building footprints	YES	
GIS data: Land use	YES	
GIS data: Links to Assessor's data	YES	
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS, Warning Sirens (3)
Other	NO	

Table 3-30: Manitou Springs Financial Mitigation Capabilities Matrix

Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES
Fees for water, sewer, gas, or electric services	YES
Impact fees for new development	YES
Incur debt through general obligation bonds	YES
Incur debt through special tax bonds	YES

Table 3-30: Manitou Springs Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Incur debt through private activities	NO
Withhold spending in hazard prone areas	NO
Stormwater service fees	YES
Other	NO

Table 3-31: Manitou Springs Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	NO
Firewise	NO - Manitou Springs applies the "Fire Adaptive Community" approach for public outreach.
StormReady	NO
Other	YES - The City distributes educational guidance to homeowners and business owners for mitigation and preparedness for flooding and wildfire through social media and other channels. The City is planning to prepare a more robust hazard Communications Plan.

3.2.7 TOWN OF MONUMENT

3.2.7.1 Legal and Regulatory Capabilities

Table 3-32 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Monument.

3.2.7.2 Administrative and Technical Capabilities

Table 3-33 identifies the Town personnel responsible for activities related to mitigation and loss prevention in Monument.

3.2.7.3 Financial Capabilities

Table 3-34 identifies financial tools or resources that Monument could use to help fund mitigation activities.

3.2.7.4 Education and Outreach Capabilities

Table 3-35identifies Education and Outreach programs that Monument could use to help residents reduce their hazard risk.

Table 3-32: Monument Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	The Town of Monument Comprehensive Plan and Parks, Trails, and Open Space Plan contain recommendations for future growth and the development of recreational amenities for the citizens of Monument. The Comprehensive Plan also contains several sub-area plans, such as the Downtown Area and the I-25 Corridor, that provide specific guidelines for growth and development in these areas. The Town of Monument Zoning and Subdivision Codes contain specific regulations to assist the Development Services Department in evaluating and reviewing new development plans. These Code sections also include hazard mitigation language to guide the Town Staff and elected officials in assuring that new development meets the requirements for the safety of existing and future residents and businesses. Chapter 8 of the Monument Municipal Code also contains information regarding the management of storm water.
Zoning ordinance	YES	See above
Subdivision ordinance	YES	See above.
Growth management ordinance	YES	The Town's Comprehensive Plan, which is recommendatory, and Zoning and Subdivision Codes provide guidance on growth management.
Floodplain ordinance	YES	The Town Code refers to floodplain management, and the Development Services Department coordinates with the Pikes Peak Regional Building Department on an as-needed basis regarding floodplain management.
Other special purpose ordinance (stormwater, steep slope, wildfire)	YES	Chapter 8 of the Municipal Code contains stringent guidelines for construction and post-construction storm water management and erosion control. Steep slopes created by development are required to provide erosion control measures to prevent sedimentation and slope failure. Where applicable, particularly in wildland/urban interface areas, the Development Services Department coordinates with the Tri-Lakes/Monument Fire Protection District to assure that newly developing areas adhere to FireWise standards and other regulatory requirements administered by the Fire District. The Town of Monument has one employee whose pay is based partially on the stormwater funding/compliance.
Building code	YES	The Pikes Peak Regional Building Department (PPRBD) administers the International Building Code (IBC), as applicable, on behalf of the Town of Monument through an intergovernmental agreement, and by reference in the Monument Municipal Code. The Town coordinates with PPRBD on the issuance of building permits and certificates of occupancy.
Fire department ISO rating	NO	This is within the purview of the Tri-Lakes/Monument Fire Protection District.
Erosion or sediment control program	YES	The Town monitors all new construction for proper erosion and sedimentation control, and through a program outlined in Chapter 8, follows up with private property owners on post-construction maintenance of storm water facilities. The Town's Public Works Department also maintains several regional detention ponds and assures that they meet all the requirements of the NPDES program.

Table 3-32: Monument Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Stormwater management	YES	The Town's Development Services Department reviews all new storm water facilities proposed for new development for compliance with Town standards, and, by reference, the City of Colorado Springs/El Paso County Drainage Criteria Manual. All developed storm water flows must be equal to or less than historic flows, and water quality capture volumes must meet established criteria before a new development can be constructed. As stated above, the Town then monitors all storm water detention facilities for compliance with Town and regional regulations.
Site plan review requirements	YES	All site plan review requirements are outlined in Chapters 16 and 17 (Subdivision and Zoning) of the Monument Municipal Code. The Development Services Department also provides developers with checklists that must be complied with in order for a project to meet the Code's Review and Approval Criteria.
Capital improvements plan	YES	The Town regularly updates its Capital Improvements Plan (CIP) in conjunction with its annual budget. Town Staff presents the CIP to the Board of Trustees for approval during the annual budget hearings.
Economic development plan	NO	
Local emergency operations plan	YES	This plan is managed by the Police Department and Town Clerk. The Town Clerk has met with El Paso County Sheriff's Office Emergency Manager in regards to their base plan and is currently working on a final draft of the EOP.
Other special plans	YES	The Town of Monument is working with the PDMP Committee in obtaining an updated version of the Pre-Disaster Mitigation Plan which will be adopted by the Town Board when finalized.
Flood insurance study or other engineering study for streams	YES	2018 County FIS
Elevation certificates	NO	These are within the purview of the Pikes Peak Regional Building Department.
Community Rating System	YES	Rating 7
National Flood Insurance Program	YES	
Community Wildfire Protection Plan	NO	
BCEGS Rating	YES	Residential 3, Commercial/Industrial 2

TABLE 3-33: MONUMENT ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES MATRIX		
Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	YES	Development Services Director (P.E.); Principal Planner; Engineering Assistant.
Engineer/professional trained in construction practices related to buildings and/or infrastructure	YES	Engineering Assistant
Planner/engineer/scientist with an understanding of natural hazards	YES	Development Services Director (P.E.); Principal Planner; Engineering Assistant.
Resiliency Planner	YES	Part-time
Transportation Planner	YES	Part-time
Personnel skilled in GIS	YES	Planning Technician
Full-time building official	YES	Under the purview of PPRBD
Floodplain manager	YES	Under the purview of PPRBD
Emergency manager	YES	Police Chief; Town Clerk
Grant writer	YES	Community Relations Specialist
Other personnel	YES	Other NIMS trained personnel
GIS data: Hazard areas	NO/YES	Newly hired Planning Technician who will concentrate on GIS data/layers; Other areas identified by El Paso County
GIS data: Critical facilities	NO/YES	See Above
GIS data: Building footprints	NO/YES	See Above
GIS data: Land use	NO/YES	See Above
GIS data: Links to Assessor's data	NO/YES	See Above
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS PDMP long term plan for ENS within the Town of Monument
Other	NO	

Table 3-34: Monument Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES
Fees for water, sewer, gas, or electric services	YES
Impact fees for new development	YES
Incur debt through general obligation bonds	NO
Incur debt through special tax bonds	YES

Table 3-34: Monument Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Incur debt through private activities	NO
Withhold spending in hazard prone areas	NO
Stormwater Service Fees	YES
Other	NO

Table 3-35: Monument Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	NO
Firewise	YES
StormReady	NO
Other	YES

3.2.8 TOWN OF PALMER LAKE

3.2.8.1 Legal and Regulatory Capabilities

Table 3-36 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Palmer Lake.

3.2.8.2 Administrative and Technical Capabilities

Table 3-37 identifies the Town personnel responsible for activities related to mitigation and loss prevention in Palmer Lake.

3.2.8.3 Financial Capabilities

Table 3-38 identifies financial tools or resources that Palmer Lake could use to help fund mitigation activities.

3.2.8.4 Education and Outreach Capabilities

Table 3-39 identifies Education and Outreach programs that Palmer Lake could use to help residents reduce their hazard risk.

Table 3-36: Palmer Lake Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	YES	The Town of Palmer Lake has a Comprehensive Plan that includes a Parks, Trails, and Open Space Plan contains recommendations for future growth and the development of recreational amenities for the citizens of Palmer Lake. The Comprehensive Plan also contains several sub-area plans, such as the Downtown Area that provide specific guidelines for growth and development in these areas. The Town of Palmer Lake Zoning and Subdivision Codes contain specific regulations to assist in evaluating and reviewing new development plans. These Code sections also include hazard mitigation language to guide the Town Staff and elected officials in assuring that new development meets the requirements for the safety of existing and future residents and businesses. Chapters 14, 16, and 17 of the Palmer Lake Municipal Code also contains information regarding the management of storm water.
Zoning ordinance	YES	See above
Subdivision ordinance	YES	See above
Growth management ordinance	YES	The Town's Comprehensive Plan, which is recommendatory, and zoning and subdivisions codes provide guidance on growth management.
Floodplain ordinance	YES	The Town code refers to floodplain management which coordinates with Pikes Peak Regional Building Department on an as-needed basis.
Other special purpose ordinance (stormwater, steep slope, wildfire)	YES	Chapter 16 of the Municipal Code contains stringent guidelines for construction and post-construction storm water management and erosion control. Steep slopes created by development are required to provide erosion control measures to prevent sedimentation and slope failure. The Town of Palmer Lake is in the process of working on a wildfire program. Currently we work closely with the Palmer Lake Volunteer Fire Department to address any new building.
Building code	YES	The Pikes Peak Regional Building Department (PPRBD) administers the International Building Code (IBC), as applicable, on behalf of the Town of Palmer Lake through an intergovernmental agreement, and by reference in the Palmer Lake Municipal Code. The Town coordinates with PPRBD on the issuance of building permits and certificates of occupancy.
Fire department ISO rating	YES	The Palmer Lake Volunteer Fire Department has an ISO rating of 5 anywhere with a fire hydrant and a 9 without a hydrant.
Erosion or sediment control program	YES	The Town will monitor erosion or sediment control pre-constructions as outlined in Chapter 16 of our Town Code.
Stormwater management	NO	Working on a plan, but for now we use an engineering firm for large projects.
Site plan review requirements	YES	All plan reviews are done by town staff under the guidelines set in Chapters 14, 16, and 17 of our Municipal Code.

Table 3-36: Palmer Lake Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Capital improvements plan	YES	The Town staff presents any proposed capital improvement plans at budget time.
Economic development plan	NO	Currently we have no Economic Development, but have just formed a committee.
Local emergency operations plan	YES	This plan is maintained by the Town Clerk with the help and input from Police and Fire. Would like to in the future meet with El Paso County Sheriff's Office Emergency Manager to go over our plan.
Other special plans	NO	
Flood insurance study or other engineering study for streams	YES	2018 County FIS
Elevation certificates	NO	These are within the purview of the Pikes Peak Regional Building Department.
Community Rating System	YES	Rating 7
Community Wildfire Protection Plan	YES	
National Flood Insurance Program	YES	
BCEGS Rating	YES	Residential 3, Commercial/Industrial 2

Table 3-37: Palmer Lake Administrative/Technical Mitigation Capabilities Matrix		
Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	YES	Outsourced, if cannot be handled by staff
Engineer/professional trained in construction practices related to buildings and/or infrastructure	YES	Under the purview of PPRBD
Planner/engineer/scientist with an understanding of natural hazards	NO	
Resiliency Planner	YES	Part time – two staff members
Transportation Planner	YES	Part time – two staff members
Personnel skilled in GIS	NO	Under the Purview of El Paso County GIS Services

Table 3-37: Palmer Lake Administrative/Technical Mitigation Capabilities Matrix		
Personnel Resources	Yes/No	Department/Position
Full-time building official	YES	Under the purview of PPRD
Floodplain manager	YES	Under the purview of PPRD
Emergency manager	YES	Town Clerk
Grant writer	NO	Sometimes volunteers
Other personnel	NO	
GIS data: Hazard areas	NO	Under the Purview of El Paso County GIS Services
GIS data: Critical facilities	NO	Under the Purview of El Paso County GIS Services
GIS data: Building footprints	NO	Under the Purview of El Paso County GIS Services
GIS data: Land use	NO	Under the Purview of El Paso County GIS Services
GIS data: Links to Assessor's data	NO	Under the Purview of El Paso County GIS Services
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS warning siren in the middle of town
Other	NO	

Table 3-38: Palmer Lake Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	YES
Authority to levy taxes for specific purposes	YES
Fees for water, sewer, gas, or electric services	YES
Impact fees for new development	YES
Incur debt through general obligation bonds	YES
Incur debt through special tax bonds	NO
Incur debt through private activities	NO
Withhold spending in hazard prone areas	NO
Stormwater service fees	NO
Other	NO

Table 3-39: Palmer Lake Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	NO

Table 3-39: Palmer Lake Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Firewise	YES
StormReady	NO
Other	YES

3.2.9 TOWN OF RAMAH

3.2.9.1 Legal and Regulatory Capabilities

Table 3-40 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Ramah.

3.2.9.2 Administrative and Technical Capabilities

Table 3-41 identifies the Town personnel responsible for activities related to mitigation and loss prevention in Ramah.

3.2.9.3 Financial Capabilities

Table 3-42 identifies financial tools or resources that Ramah could use to help fund mitigation activities.

3.2.9.4 Education and Outreach Capabilities

Table 3-43 identifies Education and Outreach programs that Ramah could use to help residents reduce their hazard risk.

Table 3-40: Ramah Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Comprehensive, Master, or General plan	NO	
Zoning ordinance	NO	No zoning within town limits
Subdivision ordinance	NO	
Growth management ordinance	NO	
Floodplain ordinance	YES	
Other special purpose ordinance (stormwater, steep slope, wildfire)	NO	
Building code	YES	IRC 2015 – part-time building inspector
Fire department ISO rating	YES	Rated 7
Erosion/sediment control program	NO	

Table 3-40: Ramah Regulatory Mitigation Capabilities Matrix		
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Stormwater management	NO	
Site plan review requirements	YES	Part of the building permit process
Capital improvements plan	NO	
Economic development plan	NO	
Local emergency operations plan	YES	
Other special plans	NO	
Flood insurance study or other engineering study for streams	YES	2018 County FIS
Elevation certificates	NO	
Community Rating System	NO	
National Flood Insurance Program	YES	
Community Wildfire Protection Plan	NO	
BCEGS Rating	YES	Residential 3, Commercial/Industrial 2

Table 3-41: Ramah Administrative/Technical Mitigation Capabilities Matrix		
Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	NO	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	NO	
Planner/engineer/scientist with an understanding of natural hazards	NO	
Resiliency Planner	YES	Part time – town clerk and fire chief
Transportation Planner	YES	
Personnel skilled in GIS	NO	Under the Purview of El Paso County GIS Services
Full-time building official	NO	Part-time
Floodplain manager	NO	Under the purview of the Town Board
Emergency manager	NO	In process of developing this position

Table 3-41: Ramah Administrative/Technical Mitigation Capabilities Matrix		
Personnel Resources	Yes/No	Department/Position
Grant writer	NO	
Other personnel	NO	
GIS data: Hazard areas	NO	Under the Purview of El Paso County GIS Services
GIS data: Critical facilities	NO	Under the Purview of El Paso County GIS Services
GIS data: Building footprints	NO	Under the Purview of El Paso County GIS Services
GIS data: Land use	NO	Under the Purview of El Paso County GIS Services
GIS data: Links to Assessor's data	NO	Under the Purview of El Paso County GIS Services
Warning systems/services (Reverse callback, cable override, outdoor warning signals)	YES	El Paso/Teller County 911 Everbridge EAS
Other	NO	

Table 3-42: Ramah Financial Mitigation Capabilities Matrix	
Financial Resources	Accessible/Eligible to Use (Yes/No)
Community Development Block Grants	YES
Capital improvements project funding	NO
Authority to levy taxes for specific purposes	YES
Fees for water, sewer, gas, or electric services	YES
Impact fees for new development	NO
Incur debt through general obligation bonds	YES, If Voter Approved
Incur debt through special tax bonds	NO
Incur debt through private activities	NO
Withhold spending in hazard prone areas	NO
Stormwater service fees	NO
Other	NO

Table 3-43: Ramah Education and Outreach Mitigation Capabilities Matrix	
Education and Outreach Resources	(Yes/No/Comments)
Local citizen groups that communicate hazard risks	NO
Firewise	NO
StormReady	NO
Other	NO

3.3 CRITICAL FACILITIES, HIGH POTENTIAL LOSS FACILITIES AND INFRASTRUCTURE SYSTEMS

Critical facilities, high potential loss facilities and infrastructure systems are those that are essential to the health and welfare of the population. These become especially important after a hazard event. As defined for this hazard mitigation plan update, critical facilities, high potential loss facilities and infrastructure systems include but are not limited to the following:

- **Critical Facilities**
  - Hospitals and medical facilities – includes ambulance service centers, urgent care centers having emergency treatment functions, and non-ambulatory surgical structures but excluding clinics, doctors' offices, and non-urgent care medical structures that do not provide these functions
  - Police and fire stations
  - Emergency operations centers
  - Evacuation shelters
  - Schools
  - Airports and heliports – includes air transportation lifelines (airports, municipal and larger), helicopter pads and structures serving emergency functions, and associated infrastructure (aviation control towers, air traffic control centers, and emergency equipment aircraft hangars).
- **High Potential Loss Facilities**
  - Nuclear power plants
  - Dams
  - Military and civil defense installations
  - Locations housing hazardous materials – includes chemical and pharmaceutical plants (chemical plant, pharmaceutical manufacturing), laboratories containing highly volatile, flammable, explosive, toxic and/or water-reactive materials, refineries, hazardous waste storage and disposal sites, aboveground gasoline or propane storage or sales centers.
- **Infrastructure Systems**
  - Water and Wastewater
  - Power Utilities
  - Transportation (roads, railways, waterways)
  - Communication systems/centers – includes main hubs for telephone, broadcasting equipment for cable systems, satellite dish systems, cellular systems, television, radio, and other emergency warning systems, but excluding towers, poles, lines, cables, and conduits
  - Energy pipelines and storage

Vulnerability of critical facilities, high potential loss facilities and infrastructure systems in identified hazard areas is discussed in more detail in Chapter 4, Hazard Identification and Risk Assessment. Due to the sensitivity of this information, a detailed list of facilities is not provided.

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Chapter 4 | Hazard Identification and Risk Assessment (HIRA)

Plan Requirements

FEMA Requirements

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

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.

Requirement §201.6(c)(2)(ii)(A): [The plan should describe vulnerability in terms of] the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of] an estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

EMAP Standards (2019)

Standard 4.1.1: The Emergency Management Program identifies the natural and human-caused hazards that potentially impact the jurisdiction using multiple sources. The Emergency Management Program assesses the risk and vulnerability of people, property, the environment, and its own operations from these hazards.

Standard 4.1.2: The Emergency Management Program conducts a consequence analysis for the hazards identified in standard 4.1.1 to consider the impact on the public; responders; continuity of operations including continued delivery of services; property, facilities, and, infrastructure; the environment; the economic condition of the jurisdiction and public confidence in the jurisdiction's governance.

This chapter profiles the natural and human-caused hazards that affect the Pikes Peak region and assesses vulnerability to those hazards. Risk assessment is the process of measuring the potential loss of life,

personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets.

This chapter is organized as follows:

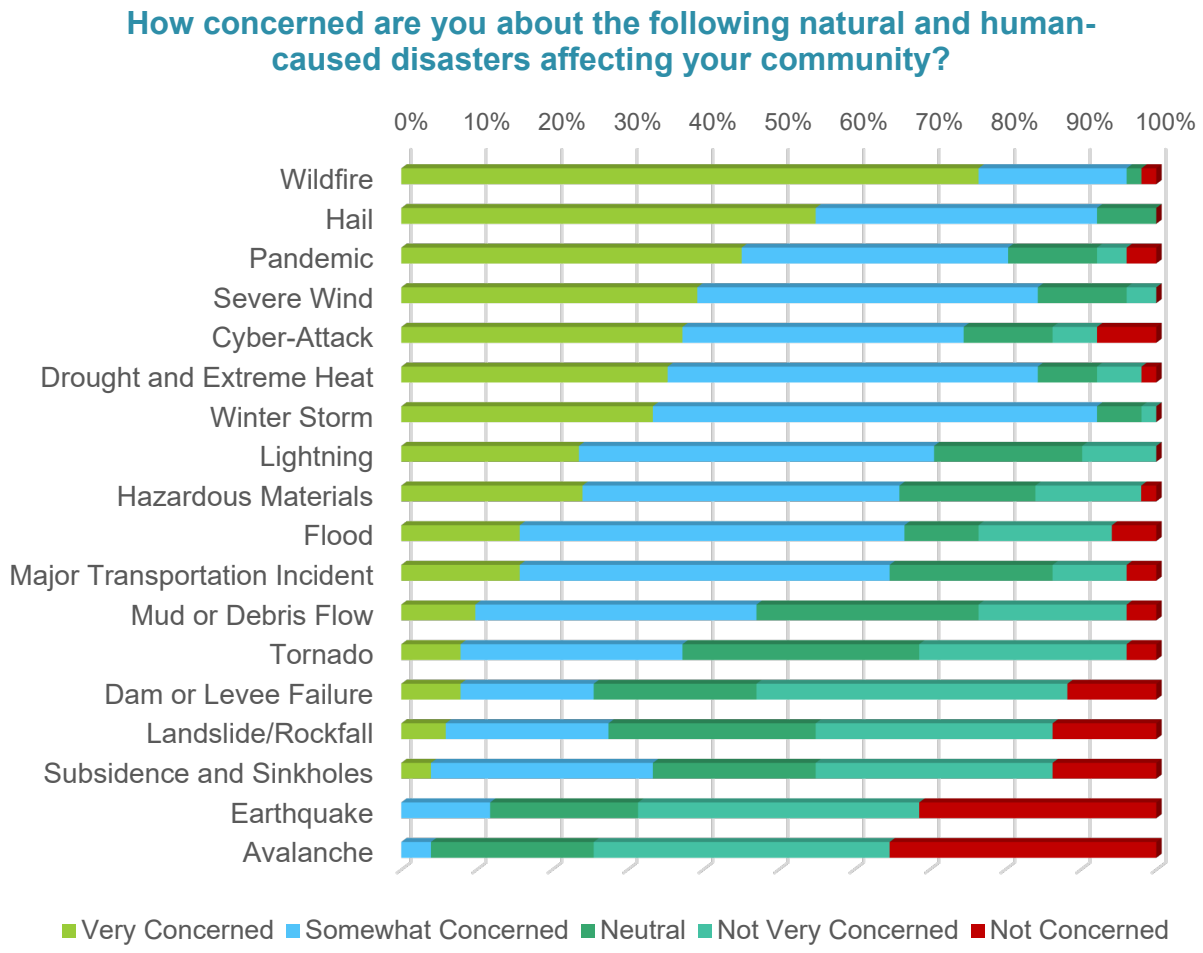
- **Section 4.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 4.2 HIRA Methodology and Consequence Analysis** describes the different methods of analyzing the identified hazards including previous occurrences, potential magnitude, and expected future frequency.
- **Section 4.3 Hazard Ranking** describes the methodology used to evaluate the degree of risk for all identified hazards in the planning area.
- **Section 4.4 Risk Assessment Tools** details methods and data sources used to assess specific hazards in the plan.
- **Section 4.5 Limitations** identifies the potential for uncertainties and data limitations associated with completing the hazard profiles.
- Hazard profiles in **Section 4.6** through **Section 4.11** describe the location of the hazard in the planning area, previous occurrences of hazard events, probability of future occurrence, and potential magnitude or severity for each identified hazard. These sections also describe overall vulnerability to each hazard and identify structures and estimate potential losses to structures in identified hazard areas.

4.1 HAZARD IDENTIFICATION

For this plan, the LPC considered a range of natural hazards that could impact the planning area and then identified and ranked hazards that present the greatest concern. The process incorporated information gleaned from the previous mitigation plans covering El Paso County and Colorado Springs, review of state and local hazard planning documents, as well as information on the frequency, magnitude and costs associated with hazards that have impacted or could impact the planning area. Anecdotal information regarding natural hazards and the perceived vulnerability of the planning area's assets to them was also used. This section addresses EMAP Standard 4.1.1 by identifying the hazards using a broad range of sources.

Figure 4-1 illustrates the results of an online survey available between mid-June to late August asking members of the community to identify hazards of concern for the planning area. Detailed results of the surveys are presented in Appendix B. The survey results indicate that wildfire, hail, and pandemic related events are perceived as top natural hazard threats to the region.

Figure 4-1: Perceived Threat of Natural & Human-Caused Hazards



Source: Created from survey results gathered during the planning process, 2020.

The hazards identified for the 2020 update and used for this risk assessment are defined in Table 4-1. The Plan defines the hazards as six distinct hazard categories with various impacts and/or variations of each category profiled (e.g., hail and lightning in severe weather).

Table 4-1: Hazards Identified for the Pikes Peak Region

Hazard Category	Hazard Impacts or Variations
Flood	Flood, Mud or Debris Flow, Dam/Levee Failure
Severe Weather	Hail, Drought & Extreme Heat, Lightning, Tornado, Wind, Winter Storm
Avalanche	Avalanche
Geologic	Earthquake, Subsidence & Sinkholes, Landfall or Rockfall
Wildfire	Wildfire
Human-caused	Hazardous Materials, Extreme Acts of Violence, Cyber Attack, Pandemic/Epidemic, Major Aircraft Incident

These hazards were presented to the LPC in both the Kickoff and Risk Assessment Meetings. Other hazards not profiled in the plan, due to the low likelihood of occurrence or low probability that property or populations would be significantly affected, or are discussed within another hazard profile are listed in Table 4-2 along with an explanation.

Table 4-2: Hazards Not Profiled in the Plan

Hazard	Explanation of Omission
Erosion and Deposition	For this plan, it is considered part of flood hazard category found in Section 4.6.
Pest Infestation	There are a variety of insect infestations that could and do impact the forest to include the Tussock Moth, Spruce Bugworm, Ash Borer, and Bark Beetle. Each of these is a contributing factor to the wildfire risk described in Section 4.10, Wildfire.
Food Scarcity	The LPC recommended inclusion of Food Scarcity as a profile. Food scarcity is discussed as a secondary impact in Section 4.7.2, Drought & Extreme Heat.
Per- and polyfluoroalkyl substances (PFAS)	In 2016, scientists found elevated levels of PFAS, a harmful chemical, in the drinking water for Security, Widefield, and Fountain. The study traced the contamination to firefighting foam used at Peterson Airforce Base (PAFB). As such, the LPC suggested profiling PFAS in this Plan. However, because the contaminate stems from military related operations, jurisdictional oversight is limited. Additionally, PAFB has swapped out at all legacy firefighting foam in hangars and on firefighting vehicles, and the base has check systems to block any outflow from the base with their new EPA-approved foam.

4.2 HIRA METHODOLOGY & CONSEQUENCE ANALYSIS

Each of the hazards identified as posing a threat in the planning area are profiled in subsequent sections. Each profile includes a summary of the overall risk and vulnerability for each identified hazard. This section describes the research methodology and defines the elements of the hazard profiles.

Detailed profiles and vulnerability assessments include the following characteristics of each identified hazard:

Hazard Definition and Extent- This section includes a description and definition of the hazard in-general, as well as key relationships to the planning area. Hazard magnitude, or extent, is also included in this section and differs for each hazard.

Previous Occurrences- Each hazard profiled in this plan includes information on the known hazard incidents and information related to the impact of those events, if known. Information from the 2015 and 2016 El Paso County and Colorado Springs Hazard Mitigation Plans was used in addition to numerous other resources to build upon the event history for the 2020 Plan update.

Vulnerability- Determines the impact of a natural or human-caused hazard events on the people, property, environment, economy, and lands of the region. If a hazard impacts these communities differently, it should also be evident from the vulnerability section. Hazard exposure and potential losses

are also summarized in this section, and the Risk Score for each specific hazard is also presented, with discussion if-warranted. This section includes the following subsections:

1) ***Spatial Extent and Geographic Location*** - describes the geographic extent or location of the hazard in the planning area and determines which participating jurisdictions are affected by each hazard.
2) ***Probability of Future Occurrence*** – uses the frequency of past events to estimate the likelihood of future occurrence. The probability, or chance of occurrence, was calculated based on historic precedence (existing data) and whether the likelihood of occurrence could be exacerbated by other events such as changing climate patterns or as a result of other conditions. Historic precedence was determined by dividing the number of events observed by the number of years and multiplying by 100. This provides the percent chance of the event happening in any given year. For example, three droughts occurring over a 30-year period suggests a 10% chance of a drought occurring in any given year.
3) ***Magnitude/Severity*** – summarizes the extent or potential extent of a hazard event in terms of deaths, injuries, property damage, and interruption of essential facilities and services.
4) ***Warning Time*** – identifies the lead time associated with the hazard event and considers the warning measures/systems in place to alert the state in advance of the event occurring.
5) ***Exposure and Losses*** - identifies existing and future structures, critical facilities, and infrastructure in identified hazard areas; and estimates potential losses to vulnerable structures, where data is available. This section meets the intent of EMAP Standards 4.1.1 and 4.1.2 by assessing the vulnerability of people, property, and the environment from these hazards. Exposure and losses were analyzed for the following categories:
    - Property
    - Population
    - Environment
    - Critical Facilities and Infrastructure
6) ***Consequence Analysis*** – includes a summary table of the potential for detrimental impacts of each hazard for the Emergency Management Accreditation Program (EMAP). Considers the impact on the following:
    - public; responders; continuity of operations including continued delivery of services; property, facilities, and infrastructure; environment; economic condition of the jurisdiction; and public confidence in the jurisdiction's governance.
7) ***Secondary Impacts*** – discusses the second and third order effects of disasters.
8) ***Future Condition Impacts -*** in-general, this section discusses how communities in the planning area deal with the hazard from a land use and development perspective, and where pressures exist that could affect risk. The extent or potential extent of the level of climate change on hazards is also discussed in this section.
9) ***Issues –*** summarizes important issues and considerations associated with each hazard.

4.3 HAZARD RANKING

For the purposes of the 2020 HMP Update, a holistic hazard ranking methodology was developed and utilized to evaluate the degree of risk for all identified hazards in the planning area. It utilizes numerical values that allow identified hazards to be ranked against one another; the higher the relative risk factor calculated, the greater the hazard risk.

Table 4-3 summarizes the categories, benchmark values, and weights used to calculate the risk factor for each hazard. The relative hazard risk score was calculated for each hazard using the following formula. Using the weighting applied, the highest possible risk factor value is 4. The higher the number, the greater the relative risk.

A collaborative process was used to determine the relative importance of probability of occurrence, magnitude/severity, spatial extent, warning time, and environmental damage.

Relative Risk = [(Probability × 0.25) + (Magnitude/Severity × 0.25) + (Spatial Extent × 0.18) + (Warning Time × 0.18) + (Environmental Damage × 0.14)]

Table 4-3: Summary of Hazard Ranking Approach and Associated Criteria

Category		Level	Degree of Risk	Numeric Value
Probability of Occurrence What is the likelihood of a hazard event occurring in a given year? (weighted average of sub-categories)	Historic Precedence (80% weight)	Unlikely	Less than 1% Annual Probability	1
		Occasional	Between 1% and 24% Annual Probability	2
		Likely	Between 25% and 75% Annual Probability	3
		Highly Likely	Greater than 75% Annual Probability	4
	Exacerbated by Other Conditions (10% weight)	Unlikely	No	1
		Occasional	Small/Uncertain Effects	2
		Likely	Likely Effects	3
		Highly Likely	Certain Effects	4
	Exacerbated by Climate Change (10% weight)	Unlikely	No	1
		Occasional	Small/Uncertain Effects	2
		Likely	Likely Effects	3
		Highly Likely	Certain Effects	4
Magnitude/Severity In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs? (average of all 3)	Population Potential for measurable life safety impacts (displacement, injuries, fatalities)	Minor	No anticipated displacement or injuries; minimal disruption on quality of life.	1
		Limited	Minor injuries and illness	2
		Critical	Isolated deaths and/or multiple injuries and illness.	3
		Catastrophic	Multiple deaths/injuries	4
	Property Loss (count & value)	Minor	Little or no property damage	1
		Limited	Minimal property damage that does not threaten structural stability	2
		Critical	Major or long-term property damage that threatens structural stability	3
		Catastrophic	Property destroyed and severely damaged	4

Category		Level	Degree of Risk	Numeric Value
	Critical Facilities & Infrastructure	Minor	No or brief interruption of essential facilities and services	1
		Limited	Interruption of essential facilities and services for less than 24 hours	2
		Critical	Interruption of essential facilities and services for 24-72 hours	3
		Catastrophic	Interruption of essential facilities and services for more than 72 hours	4
Spatial Extent How large of an area could be impacted by this hazard event? Are impacts localized or regional?		Negligible	Less than 1% of area affected	1
		Limited	Between 1% and 25% of area affected	2
		Moderate	Between 25% and 50% of area affected	3
		Significant	Greater than 50% of area affected	4
Warning time Is there usually some lead time associated with the hazard event? Have warning measures been implemented?		Maximum	Warning time is more than 24 hours	1
		Significant	Warning time is 12 to 24 hours	2
		Moderate	Warning time is 6 to 12 hours	3
		Minimal	Warning time is less than 6 hours	4
Environmental Damage The negative consequences of a hazard on the environment, including soil, water, air, and/or plants and animals.		None	Not likely to result in environmental damage	1
		Minor	Could cause localized and reversible damage. Quick clean up possible	2
		Moderate	Could cause major but reversible damage. Full clean up difficult	3
		Severe	Could cause irreversible environmental damage. Full clean up not possible.	4

Results of the Hazard Ranking are presented in

Table 4-4 below. A Risk Score has been developed for each hazard in the planning area and is discussed further in each hazard profile in this Plan. The methodology for risk evaluation has been updated from the El Paso County and Colorado Springs respective evaluation systems. This system is outlined in Table 4-3 and the process and outcomes have been reviewed by the participating communities who also support them as appropriate.

Table 4-4: Overall Hazard Risk Ranking

	Calhan	Colorado Springs	El Paso County	Fountain	Green Mountain Falls	Manitou Springs	Monument	Palmer Lake	Ramah	Regionwide
Aircraft Incident	Moderate	Moderate	Moderate	Moderate	Low	Low	Moderate	Low	Low	Moderate
Avalanche	Negligible	Low	Low	Negligible	Low	Negligible	Negligible	Negligible	Negligible	Low
Cyber-Attack	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Dam/Levee Failure	Low	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Low	Low	Moderate
Drought & Extreme Heat	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Earthquake	Low	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Low	Moderate
Extreme Acts of Violence	Low	Moderate	Moderate	Low	Low	Low	Low	Low	Low	Low
Flood	Low	High	High	Moderate	High	High	Moderate	Low	Low	Moderate
Hail	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Hazmat	Low	High	Moderate	High	Low	Moderate	High	Moderate	Low	Moderate

	Calhan	Colorado Springs	El Paso County	Fountain	Green Mountain Falls	Manitou Springs	Monument	Palmer Lake	Ramah	Regionwide
Landfall/Rockfall	Negligible	High	Moderate	Low	Low	Moderate	Low	Negligible	Negligible	Low
Lightning	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Moderate
Mud or Debris Flow	Negligible	High	Moderate	Low	High	High	Low	High	Negligible	Moderate
Pandemic/ Epidemic	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Subsidence & Sinkholes	Negligible	Moderate	Low	Negligible	Negligible	Low	Negligible	Negligible	Negligible	Low
Tornado	Moderate	Moderate	Moderate	Moderate	Low	Low	Low	Low	Moderate	Moderate
Wind	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Wildfire	Low	High	High	Moderate	High	High	High	High	Low	High
Winter Storm	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

4.4 RISK ASSESSMENT TOOLS

4.4.1 EARTHQUAKE AND FLOOD – HAZUS-MH

Overview

HAZUS-MH is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. HAZUS-MH simulates earthquake and flood events and the impacts that would be generated from those hypothetical events. A wide range of inventory data including demographics, building stock, critical facility, transportation, and utility datasets are provided to understand values as risk for a community. Additionally, user-defined facilities can be generated to provide more accurate data for the hazard simulations. The program tabulates and maps hazard data and the economic losses estimates for buildings and civil infrastructure. Impacts to populations are also provided by the software.

Levels of Detail for Evaluation

HAZUS-MH provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- Level 1—All of the information needed to produce an estimate of losses is included in the software's default data. These data are derived from national databases and described in general terms the characteristic parameters of the planning area.
- Level 2—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- Level 3—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

Application for This Plan

The following methods were used to assess specific hazards for this plan:

- Earthquake—A Level 2 analysis was performed to assess earthquake risk and exposure. Earthquake scenario and probabilistic data prepared by the U.S. Geological Survey (USGS) and State of Colorado were used for the analysis of this hazard. An updated general building stock inventory was developed using replacement cost values and detailed structure information from assessor tables. An updated inventory of essential facilities, transportation and utility features was used in place of the HAZUS-MH defaults. Two scenario events and one probabilistic event were modeled:

  - The scenario events were Magnitude-5.0 events on the Rampart and Ute Pass Faults
  - The standard HAZUS analysis for the 500-year probabilistic event was run.
- Flooding—A Level 2 analysis was performed with user-defined facilities. GIS building and assessor data (replacement cost values and detailed structure information) were loaded into HAZUS-MH. The HAZUS-MH defaults for essential facilities, transportation and utilities were supplemented with additional data where available. Current El Paso County digital flood insurance rate maps (DFIRMs) were used to delineate flood hazard areas and estimate potential losses from the 100-year flood event. Using the DFIRM floodplain boundaries and a countywide 10-foot digital elevation model (DEM) flood depth grids were generated and integrated into the model.

4.4.2 OTHER HAZARDS OF CONCERN

For hazards of concern that are not directly modeled in HAZUS, specific future losses could not be estimated. For other hazards with an estimated spatial location, a structure-based risk assessment was performed. A structure layer was developed from assessor's data and supplemented with additional information such as building polygons, population, and other demographic data. Exposure to these spatial hazards were tabulated for value as risk, estimate population, and other indicators of risk. For hazards without a defined spatial extent, a qualitative analysis was conducted using the best available data and professional judgment.

Locally relevant information was gathered from a variety of sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists, and others. The primary data source was the El Paso County GIS database, augmented with state and federal data sets. Additional data sources for specific hazards were as follows:

- **Aircraft Incident –** Information on previous aircraft incidents and accidents was obtained from the National Transportation Safety Board Aviation Accident Database.
- **Avalanche—** The Colorado Avalanche Information Center (CAIC) was used to forecast backcountry and mountain weather conditions for ten avalanche zones, including the area surrounding Pikes Peak which is part of the Front Range forecast zone. In addition, a slope analysis was performed in order to identify areas that may potentially be at risk for an avalanche event (that is, slopes greater than 30 degrees and above 8000 feet in elevation). A general building stock analysis was performed using GIS building and assessor data (replacement cost values and detailed structure information) to estimate the exposure values.
- **Cyber-Attack –** Information on previous cyber-attack events was obtained from Statescoop.
- **Dam & Levee Failure**—Dam failure inundation mapping for the planning area has been completed within high risk dam emergency action plans. For security reasons, these maps were excluded from this plan. An inventory of dams was obtained from the 2018 National Inventory of Dams (NID) database and an inventory of levees was obtained from the U.S. Army Corps of Engineers National Levee Database.
- **Drought & Extreme Heat—**Information on historical and projected impacts from drought and extreme heat were obtained from the National Drought Mitigation Center, the National Oceanic

and Atmospheric Administration (NOAA), the National Resource Defense Council (NRDC), and the Western Regional Climate Center.

- **Hailstorm –** Information on previous hailstorm events was obtained from National Climatic Data Center's Storm Events Database. Reported losses due to hail (1955-2018) were also gathered and summarized by jurisdiction.
- **Landslide or Rockfall –** Landslide and rockfall risk layers were obtained from the Colorado Geologic Survey. Layers consisted of historically mapped landslides from the Colorado Landslide Inventory, other published historical information, and landslide susceptibility areas. The Colorado Geologic Survey's rockfall layer was also used. A general building stock analysis was performed using GIS building and assessor data (replacement cost values and detailed structure information) to estimate the exposure values.
- **Lightning –** Information on historical lightning strikes and injuries, fatalities, and property damage was obtained from the National Climatic Data Center Storm Events Database and National Lightning Detection Network. Historic lightning observations were buffered by 15 miles to create a lightning hazard layer. A general building stock analysis was performed using GIS building and assessor data (replacement cost values and detailed structure information) to estimate the exposure values.
- **Mud or Debris Flow –** Information on the potential for future mud or debris flow events was obtained from the Colorado Geologic Survey's alluvial fan and mud/debris flow layers. A general building stock analysis was performed using GIS building and assessor data (replacement cost values and detailed structure information) to estimate the exposure values.
- **Pandemic Disease –** No data on economic loss estimates were available for pandemic disease. Information on previous pandemic occurrences was obtained from the Centers for Disease Control and Prevention (CDC).
- **Tornado -** Information on previous tornadoes in El Paso County were obtained from National Climatic Data Center's Storm Events Database, the National Weather Service, and NOAA. Economic loss data was not available. Therefore, the maximum observed tornados (F-Scale) and expected damage at those wind speeds was used as a surrogate to estimate exposure values.
- **Subsidence and Sinkholes -** Information on subsidence and sinkholes in El Paso County were obtained from the Colorado Geological Survey. Specifically, CGS's Subsidence Hazards and Evaporite Bedrock layers were combined to form a hazard layer. A general building stock analysis was performed using GIS building and assessor data (replacement cost values and detailed structure information) to estimate the exposure values.
- **Severe Wind -** Information on previous severe wind events in El Paso County was obtained from National Climatic Data Center's Storm Events Database and NOAA. Economic loss data was not available. Therefore, the maximum observed wind speeds (MPH) and expected damage at those wind speeds was used as a surrogate to estimate exposure values.

- **Wildfire**—Information on wildfire hazards areas was provided by Colorado Wildfire Risk Assessment Portal (CO-WRAP).
- **Winter Storm –** Information on previous winter storms in El Paso County was obtained from National Climatic Data Center's Storm Events Database.

4.5 LIMITATIONS

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximated structure inventory, demographic, and economic parameter data
- Uncertainty regarding the geographic extent and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents receive to prepare for a specific hazard event.
- Compounding effects of one hazard on the probability and magnitude of other hazards
- Approximations and simplifications necessary to conduct a study
- Community resiliency and the ability to recover varies by location

These factors can affect loss estimates by orders of magnitude. Therefore, potential exposure and loss estimates are approximate. The results do not predict precise outcomes and should be used only to understand relative risk.

4.6 FLOOD, DAM AND LEVEE FAILURE, & MUD OR DEBRIS FLOW

The hazards profiled in section 4.6 are events resulting from water related disasters which include the following for El Paso County and the participating jurisdictions:

- Flood
- Dam and Levee Failure
- Mud or Debris Flow

4.6.1 FLOOD

4.6.1.1 Definition and Extent

The following description of flooding is excerpted from the 2018 State of Colorado Hazard Mitigation Plan.

A flood is a general and temporary condition of partial or complete inundation of normally dry land areas from:

- the overflow of stream banks,
- the unusual and rapid accumulation of runoff of surface waters from any source, or
- mudflows or the sudden collapse of shoreline land.

DEFINITIONS

100-year flood: represents a flood that has a 1% chance of being equaled or exceeded in any single year.

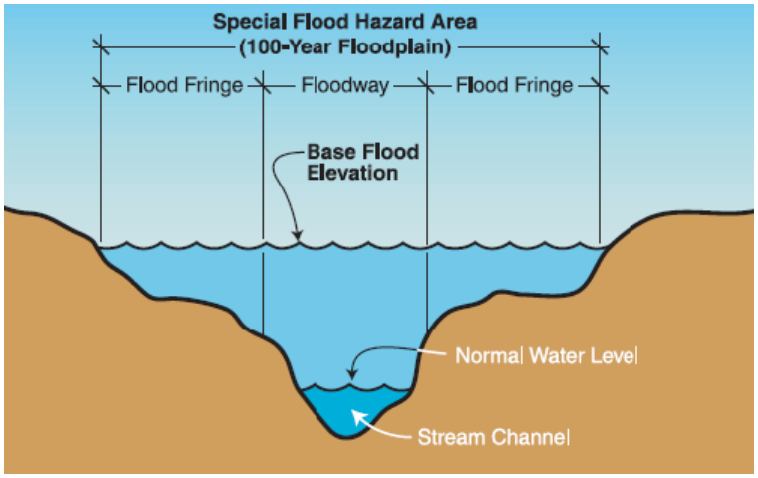
Floodplain: are lowlands, adjacent to rivers, streams, and creeks that are subject to recurring floods.

Flooding results when the flow of water is greater than the normal carrying capacity of the stream channel. Rate of rise, magnitude (or peak discharge), duration, and frequency of floods are a function of specific physiographic characteristics. Generally, the rise in water surface elevation is quite rapid on small (and steep gradient) streams and slow in large (and flat sloped) streams. The causes of floods relate directly to the accumulation of water from precipitation, rapid snowmelt, or the failure of manmade structures, such as dams or levees. Floods caused by precipitation are further classified as coming from: rain in a general storm system, rain in a localized intense thunderstorm, melting snow, rain on melting snow, and ice jams.

Floodplains

As illustrated in Figure 4-2, floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods. Flash floods, usually resulting from heavy rains or rapid snowmelt, can flood areas not typically subject to flooding, including urban areas.

Figure 4-2: Special Flood Hazard Area



Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

Measuring Floods and Floodplains

The frequency and severity of flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year. Flood studies use historical records to estimate the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1-percent chance of being equaled or exceeded in any given year. The "annual flood" is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The same flood can have different recurrence intervals at different points on a river.

The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is used as the regulatory boundary by many agencies. Also referred to as the special flood hazard area (SFHA), this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities. Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating flood damage.

Effects of Human Activities

Because they border water bodies, floodplains have historically been popular sites to establish settlements. But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface

effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

4.6.1.2 Previous Occurrences

Flood hazards throughout the Pikes Peak region exist along major and minor rivers and streams throughout the County, as well as in the areas downhill of burn scars. The National Climatic Data Center Storm Events Database and the Spatial Hazards Events and Loss Database for the United States list 25 events in El Paso County between 1979 and 2019 for which estimated property damage costs were recorded. These events are listed in Table 4-5.

Table 4-5: El Paso County Flood Events with Recorded Property Damage, 1979 - 2019

Location	Date	Estimated Property Damage
El Paso County	6/9/1979	$794
El Paso County	6/19/1980	$2,000,000
El Paso County	8/6/1981	$80,000
El Paso County	6/3/1995	$1,000,000
Manitou Springs	4/29/1999	$28,000,000
Northern El Paso County/Monument Ridge	4/30/1999	$2,000,000
Southern El Paso County/Colorado Springs & Vicinity	4/30/1999	$14,000,000
Calhan	8/5/2004	$200,000
Colorado Springs	6/21/2005	$100,000
Peterson Air Force Base	9/12/2008	$20,000
Green Mountain Falls	7/4/2010	$5,000
Chipita Park	7/30/2012	$15,000,000
Manitou Springs	7/30/2012	$100,000
Colorado Springs	7/30/2012	$20,000
Manitou Springs	7/1/2013	$14,000,000
Black Forest	8/4/2013	$20,000
Cascade	8/9/2013	$2,000,000
Green Mountain Falls	8/22/2013	$40,000
Green Mountain Falls	8/22/2013	$10,000
Manitou Springs	9/12/2013	$100,000
Fountain	9/12/2013	$3,000,000
Security	9/12/2013	$7,000,000
Manitou Springs	8/10/2015	$6,700,000
Colorado Springs	8/29/2016	$150,000

Source: National Climatic Data Center and SHELDUS. Events before 1999 do not have jurisdiction-specific information available.

Notable incidents from the Storm Events Database and other resources are described below:

April 1999 — Heavy rain, with amounts between 3 and 6 inches, swelled the Monument Creek and Fountain Creek watersheds to overflowing on April 29. The fast-moving waters caused much bank erosion and flooded many areas adjacent to Fountain Creek from Manitou Springs through Colorado Springs to Fountain. Damage to agricultural lands, irrigation systems, trails, roads, sewer treatment plants, and other public and private property was estimated at near $30 million. The bridge at 21st Street over Fountain Creek in western Colorado Springs on Highway 24, the major east-west highway heading up into the mountains, was deemed unsafe, and was closed for three weeks. On April 30, power went out for about 24 hours in Fountain and surrounding area when power lines over Fountain Creek were brought down by floodwaters. Many sewer lines in southern Colorado Springs backed up into scores of residences and businesses, causing damage. The flooding in Manitou Springs is shown in Figure 4-3.

Figure 4-3: Flooding in Manitou Springs, 1999

Source: U.S. A+

July 2012 — Slow moving thunderstorms produced heavy rainfall of 1 to 3 inches across Black Forest and northern Colorado Springs. A drainage channel was heavily damaged by the fast-flowing high water. Heavy rain caused flash flooding and debris flows off of the Waldo Canyon burn scar. Debris flowed across US Highway 24 northwest of Cascade, closing the westbound lanes for a few hours. At Ute Pass Elementary School, playground equipment was destroyed and covered in mud, but the school building was undamaged. The rapid rise of flood waters during this event can be seen in Figure 4-4 and Figure 4-5 below. The images were taken approximately 35 minutes apart.

Figure 4-4: Monument Creek Flood 5:15PM, 2012

Figure 4-5: Monument Creek Flood 5:50PM, 2012

Source: Photos courtesy of Tom Gill and Steve Reed

August 2013 — Very heavy rainfall of around 1.5 inches (with rainfall rates up to 5 inches per hour) occurred across the Waldo and Williams Canyon watersheds, producing flooding on U.S. Highway 24 and in Manitou Springs. Flash flooding occurred from Cascade to Waldo Canyon along U.S. Highway 24. Water and debris over 3 feet deep from Waldo Canyon stranded 40 vehicles in the westbound lanes, with several cars sent racing down a drainage onto the westbound entrance ramp from Manitou Springs. Business Route 24 out of Manitou Springs was severely damaged and closed. One man drowned in the debris flow near the mouth of Waldo Canyon. In Manitou Springs there was major flooding from Williams Creek. Several structures near and on Canon Avenue and Manitou Avenue, including the Spa Building and Arcade, experienced deep water, mud and debris flows. Fountain Creek overflowed, flooding many businesses. Forty vehicles were damaged or destroyed. There were no fatalities in Manitou Springs, although there were two water rescues along Fountain Creek. Woodland Park in Teller County reported around 3 inches of rain in an hour, causing a wave of floodwaters to move down Fountain Creek. The flood wave took over 3 hours to reach Manitou Springs. Houses were flooded in the Crystola area, along with two restaurants in Green Mountain Falls and Cascade. There was minor flooding from Cascade to near Manitou Springs, where an exit road to Manitou Springs was flooded for a time. Flash flooding was widespread from Monument into the north side of Colorado Springs, where over 4 inches of rain fell in a few spots. Interstate 25 was closed for a time on the north side of Colorado Springs. Numerous other rural roads and streets were flooded. Flash flooding occurred from Security to Ellicott to southeast El Paso County. The storms produced flash flooding with rainfall amounts of over 5 inches along State Highway 115 southwest of Colorado Springs.

September 2013 —Storms produced heavy rain across western El Paso County and the Waldo Canyon burn scar. There was flooding on U.S. Highway 24 and numerous streets on the west side of Colorado Springs. A man drowned in Fountain Creek near Nevada Avenue. Rock Creek, Cheyenne Creek, and Fountain Creek experienced flash flooding and general flooding. Rock and Cheyenne Creek watersheds experienced significant damage to infrastructure. Eighty-nine houses were flooded along Cheyenne Creek. Fountain Creek was in flood for several hours from southern Colorado Springs to the El Paso County - Pueblo County line. A loss of life occurred in Sand Creek because of fast-flowing water in the channel.

Repetitive Loss Properties

A repetitive loss property is one that has had two or more losses with at least $1,000 payments form the NFIP within a 10-year period since 1978. A severe repetitive loss property has had four NFIP payment of over $5,000 total more than $20,000 or at least two separate NFIP payments with the cumulative amount exceeding the market value of the building. Information provided by the Colorado Water Conservation Board (CWCB) indicates a total of 34 repetitive loss properties within the planning area. Of those, 19 are in Colorado Springs, 13 are in Manitou Springs and 1 is in Cascade. Sixty-eight percent are single-family residential, 6 percent are multi-family, 9 percent are business-nonresidential, and 18 percent are classified as other. No Severe Repetitive Loss properties were noted.

Federal Flood Programs

National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. For most participating communities, FEMA has prepared a detailed Flood

Insurance Study (FIS). The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principal tools for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria 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.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

El Paso County and its incorporated communities participate in the NFIP program. Structures permitted or built in the County before the program began are called “pre-FIRM” structures, and structures built afterwards are called “post-FIRM.” The insurance rate is different for the two types of structures. The effective date for the current countywide FIRM is December 7, 2018. At the time of this update the County and jurisdictions saw a decrease in the mapped flood risk. This is attributed to additional infrastructure and mitigation measures put into place between the 1997 and 1999 effective maps and this update. The County and participating communities are currently in good standing with the provisions of the NFIP. Compliance is monitored by FEMA regional staff. Maintaining compliance under the NFIP is an important component of flood risk reduction.

The Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations

- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks. Table 4-6 below summarizes community CRS participation.

Table 4-6: CRS Date of Participation and Current Class of Communities in El Paso County, Effective May 2019

	CRS Entry Date	Current Effective Date	CRS Classification
Town of Calhan	Not Participating		
City of Colorado Springs	10/1/1992	10/1/2017	5
El Paso County	10/1/1992	10/1/2010	7
City of Fountain	10/1/1992	10/1/2010	7
Town of Green Mountain Falls	10/1/2003	10/1/2010	7
City of Manitou Springs	10/1/1992	10/1/2010	7
Town of Monument	10/1/2003	10/1/2010	7
Town of Palmer Lake	10/1/2003	10/1/2010	7
Town of Ramah	Not Participating		

4.6.1.3 Vulnerability

Table 4-7: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Occasional	Minor	Limited	Maximum	Negligible	Low
Colorado Springs	Likely	Critical	Limited	Maximum	Moderate	High
El Paso County	Likely	Critical	Limited	Maximum	Moderate	High
Fountain	Occasional	Minor	Limited	Maximum	Minor	Moderate
Green Mtn Falls	Likely	Limited	Limited	Maximum	Moderate	High
Manitou Springs	Likely	Limited	Limited	Maximum	Moderate	High
Monument	Occasional	Minor	Limited	Maximum	Minor	Moderate
Palmer Lake	Occasional	Minor	Limited	Maximum	Negligible	Low
Ramah	Occasional	Minor	Limited	Maximum	Negligible	Low
Regionwide	Likely	Limited	Limited	Maximum	Moderate	Moderate

Spatial Extent and Geographic Location

The planning area has 87,040 acres in the 100-year floodplain and 90,240 acres in the 500-year floodplain. Table 4-8 shows the distribution of the acreage across the jurisdictions of the planning area exposed to the 100-year floodplain and 500-year floodplain hazard.

Table 4-8: Acreage in 100-year and 500-year Floodplain by Jurisdiction

Jurisdiction	Acres in 100-Year Floodplain	Acres in 500-Year Floodplain
Calhan	64	64
Colorado Springs	5,056	6,400
El Paso County	79,360	80,640
Fountain	1,920	2,560
Green Mountain Falls	64	64
Manitou Springs	192	192
Monument	320	320
Palmer Lake	128	128
Ramah	64	64
Regionwide	**87,040**	**90,240**

Areas that have been impacted by burn scars, such as the Fountain Creek Drainage, will continue to see a higher risk of flood events. Figure 4-6 and Figure 4-7 depict flood hazard susceptibility for El Paso County and the participating jurisdictions, respectively.

Figure 4-6: Flood Hazard Susceptibility, El Paso County

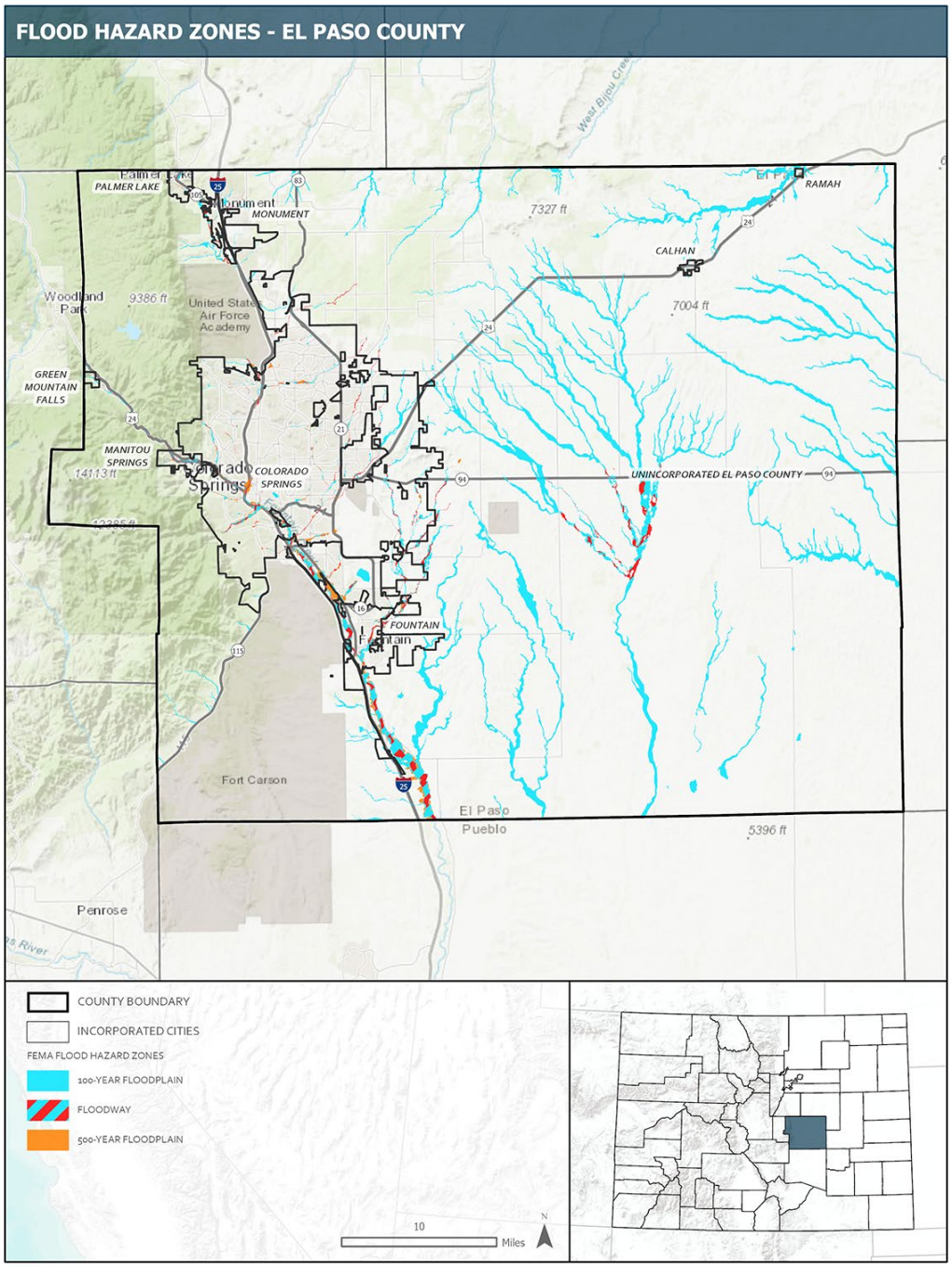
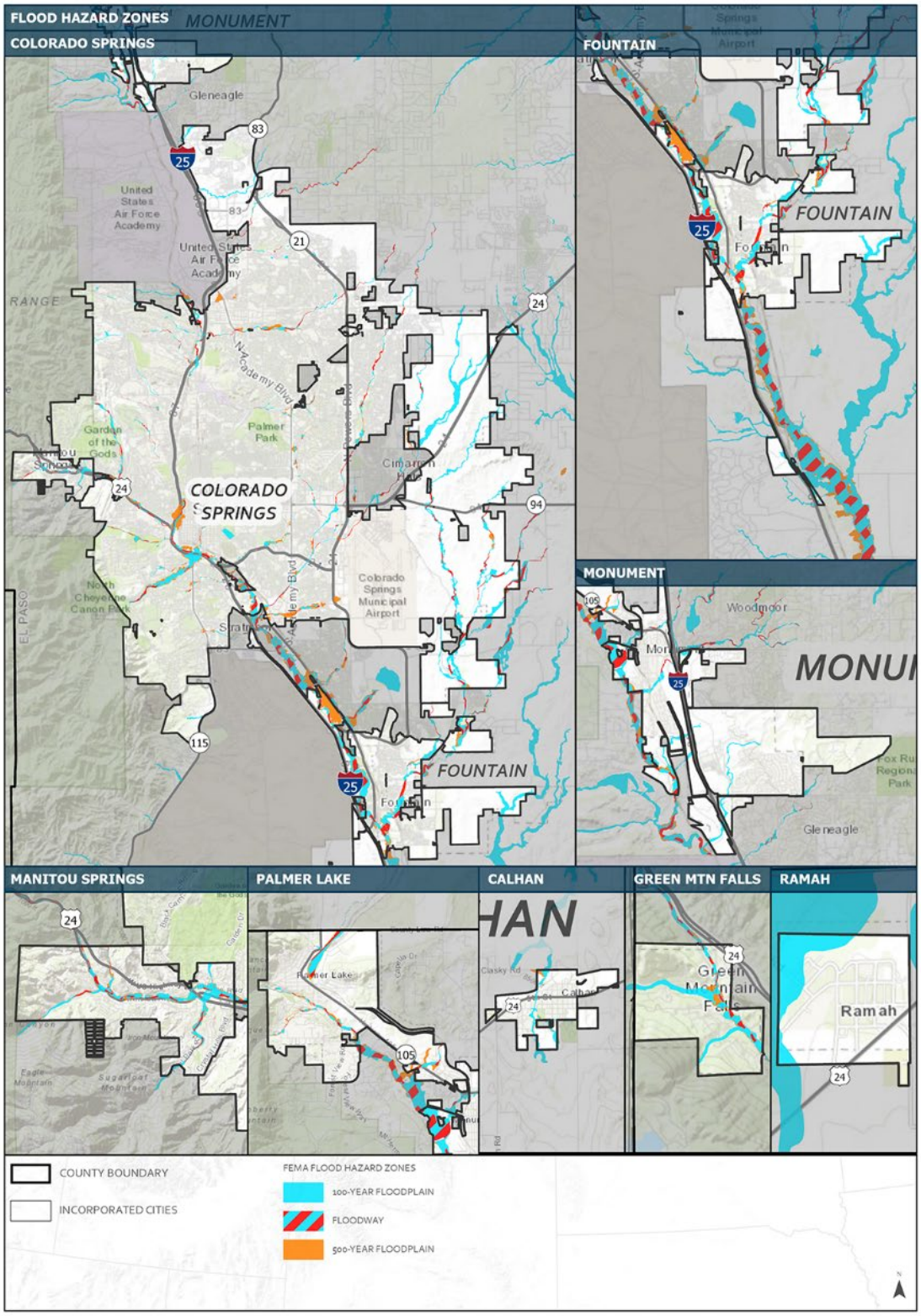


Figure 4-7: Flood Hazard Susceptibility, Participating Jurisdictions



Probability of Future Occurrence

Flood occurrence is considered to be **likely**. The County has experienced 25 flood events with recorded damage over the last 40 years as indicated in Table 4-5 with a recurrence rate of 1.6 years on average. However, many of these events are related to the Hayman and Waldo Canyon fires that have impacted the area in 2002 and 2012, respectively. Hydrologists from the U.S. Army Corps of Engineers, the Burned Area Emergency Response (BAER) Team, and the National Weather Service have cautioned that areas downstream of the Waldo Canyon Fire burn scar may experience a 100-year flood every 10 years until the burned vegetation and soils regenerate. As conditions slowly improve over time, this probability may go down, but new fires in the area will again increase the frequency of damaging flood events.

Magnitude / Severity

Based on the information in this hazard profile, the magnitude/severity of typical flooding is **limited** — It is likely that events can result in minor injuries or illness, minimal property damage that threatens structural stability; and/or interruption of essential facilities for less than 24 hours.

However, the impacts of wildfire events on flood severity in the County are significant. Post-fire conditions in El Paso County will result in higher flows, more debris, and the potential for water to overflow channels and embankments causing significant additional damage. Damage to bridges and utility crossings from the increased flows may result in power outages, hazardous conditions, and contamination to waters and the surrounding areas (U.S. Army Corps of Engineers, 2012). Given these considerations, the flood hazard in communities recently impacted by wildfire is considered to be **critical**: isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24 to 72 hours.

Warning Time

Because of the sequential pattern of meteorological conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Warning times for floods can be between 24 and 48 hours. Flash flooding can be less predictable, but potential hazard areas can be warned in advanced of potential flash flooding danger. A flash flood monitoring system, developed by Pikes Peak Regional Building Department's Floodplain Administration, continuously transmits rain and stream data to Emergency Management agencies. Flood warnings are also issued by radio and television media, NOAA weather radio, public address systems, emergency sirens or emergency personnel. Police and fire officials may be on hand to direct evacuation.

The National Weather Service has issued general flood forecasting guidance for the region. Although it can be difficult to predict how much rain will result in a flood event on any given day, there are some general principles regarding when flood events are more likely to occur (National Weather Service, 2010):

- If 1 inch or more of rain falls in an urban or mountain area in 1 hour, a flood statement should be issued. In mountain areas, a flash flood warning may be necessary.
- If 2 or more inches of rain falls in an urban or mountain area in 1 hour, a flash flood warning should be issued.

- In rural areas on the plains, if rainfall reaches 2 inches in 1 hour, a flood statement should be issued and if rainfall reaches 3 inches in 1 hour a flash flood warning should be issued.
- If precipitable water values exceed 150 percent of normal, this is a good indicator that flash flood producing rains will develop if precipitation occurs.

Exposure and Losses

The Level 2 HAZUS-MH protocol was used to assess the risk and vulnerability to flooding in the planning area. The model used census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. Where possible, the HAZUS-MH default data were enhanced using local GIS data from county, state, and federal sources.

Over the last several years updated flood risk delineations have been developed for multiple streams and watersheds, resulting in new effective maps for incorporated areas in the county and at the county level. The improved and refined data has resulted in an overall reduction in flood risk, which is reflected in this analysis.

➢ Property

Table 4-9 summarizes the total number of structures in the floodplain by municipality. The HAZUS-MH model determined that there are 2,056 structures within the 100-year floodplain and 4,386 structures within the 500-year floodplain. In the 100-year floodplain, 81 percent of the structures are residential, and 11 percent are commercial, industrial or agricultural.

Table 4-9: Structures Exposed to 100- & 500-Year Floodplain

Jurisdiction	100-year floodplain		500-year floodplain	
	Total Exposed Structure Count	Total Exposed Structure (%)	Total Exposed Structure Count	Total Exposed Structure (%)
Calhan	1	0.2%	1	0.2%
Colorado Springs	865	0.6%	1,889	1.4%
El Paso County	955	1.3%	1,687	2.3%
Fountain	20	0.2%	516	5.9%
Green Mtn Falls	31	8.2%	41	10.9%
Manitou Springs	172	8.1%	208	9.7%
Monument	3	0.1%	3	0.1%
Palmer Lake	9	0.7%	41	3.3%
Ramah	0	0%	0	0%
Regionwide	**2,056**	**0.9%**	**4,386**	**1.9**

Table 4-10 summarizes the estimated value of exposed buildings in the planning area. This methodology estimated over $481 million worth of building, contents, and inventory exposure to the 100-year flood, representing 0.6 percent of the total assessed value of the planning area.

Table 4-10: 100-Year Flooding Exposure on Building, Contents and Inventory

Jurisdiction	Building Loss	Content Loss	Inventory Loss	Total	% of total Market Value
Calhan	$2,480	$4,961	$28,888	$36,329	0.0%
Colorado Springs	$82,894,936	$149,207,416	$37,722,543	$269,824,895	0.2%
El Paso County	$86,901,269	$63,333,341	$17,510,074	$167,744,683	0.5%
Fountain	$1,029,130	$1,623,019	$639,872	$3,292,020	0.1%
Green Mtn Falls	$854,922	$790,207	$709,483	$2,354,612	1.1%
Manitou Springs	$20,014,996	$12,137,502	$4,431,489	$36,583,987	3.1%
Monument	$119,744	$73,073	$419,056	$611,873	0.01%
Palmer Lake	$511,302	$297,557	$23,602	$832,461	0.2%
Ramah	$0	$0	$0	$0	0.0%
Regionwide	**$192,328,779**	**$227,467,076**	**$61,485,007**	**$481,280,862**	**0.6%**

Building Loss: Loss from building repair or replacement
Content Loss: Loss from contents
Inventory Loss: Loss from business inventory specifically
Total: Sum of building, content and inventory loss.
% of Total Market Value: Loss in percent terms of total market values in the jurisdiction

➢ Population

It was estimated that the exposed population for the entire County is 4,203 within the 100-year floodplain (0.7 percent of the total county population). For the 500-year floodplain, it is estimated that 10,706 persons reside within the floodplain (1.7 percent of the total County population).

Table 4-11: Population Exposed to 100- & 500-Year Floodplain

Jurisdiction	100-year floodplain		500-year floodplain	
	Total Exposed Population Count	Total Exposed Population (%)	Total Exposed Population Count	Total Exposed Population (%)
Calhan	0	0.0%	0	0.0%
Colorado Springs	1,999	0.5%	4,763	1.1%
El Paso County	1,802	1.1%	3,955	2.5%
Fountain	33	0.1%	1,497	5.8%
Green Mtn Falls	47	7.0%	64	9.6%
Manitou Springs	301	6.1%	360	7.2%
Monument	2	0.0%	2	0.0%
Palmer Lake	17	0.7%	63	2.6%
Ramah	0	0.0%	0	0.0%
Regionwide	**4,203**	**0.7%**	**10,706**	**1.7%**

Environment

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, with human development factored in, flooding can impact the environment in negative ways. Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape. Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development such as bridge abutments and levees, and logjams from timber harvesting can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses.

Critical Facilities and Infrastructure

Many miles of road and rail infrastructure are exposed to the 100-year floodplain in the planning area. Roads or railroads that are blocked or damaged can isolate residents and can prevent access throughout the County, including for emergency service providers needing to get to vulnerable populations or to make repairs. Bridges washed out or blocked by floods or debris also can cause isolation. Water and sewer systems can be flooded or backed up, causing health problems. Underground utilities can be damaged. Dikes can fail or be overtopped, inundating the land that they protect. The following sections describe specific types of critical infrastructure.

The major roads in the planning area that pass through the 100-year floodplain and thus are exposed to flooding include:

U.S. Interstate 25	State Highway 16	State Highway 21
State Highway 83	State Highway 94	State Highway 105
State Highway 115	U.S. Highway 24	U.S. Highway 85.

In severe flood events, these roads can be blocked or damaged, preventing access to some areas.

Flooding events can significantly impact road bridges. These are important because often they provide the only ingress and egress to some neighborhoods. An analysis showed that there are over 200 bridges that are in or cross over the 100-year floodplain.

Water and sewer systems can be affected by flooding. Floodwaters can back up drainage systems, causing localized flooding. Culverts can be blocked by debris from flood events, also causing localized urban flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing wastewater to spill into homes, neighborhoods, rivers, and streams. Two wastewater facilities are identified in the 100-year floodplain.

Erosion and deposition along riverways can also impact critical facilities and infrastructure as erosion removes the buffer between facilities and infrastructure and deposition changes riverine flooding

behaviors. Ensuring the rivers and riparian environments are healthy and maintained, particularly following a flood event, can help mitigate these impacts.

Levees have historically been used to control flooding in portions of the planning area. The U.S. Army Corps of Engineers lists three levees in the National Levee Database, all within the City of Colorado Springs. It is possible that there are additional levees within the County that are not listed within this database. Additional levees may be located on smaller rivers, streams, and creeks that protect small areas of land. They may have been built under earlier flood management goals. Many older levees are exposed to scouring and failure due to old age and construction methods.

Table 4-12 summarizes the critical facilities and infrastructure facilities in the 100-year year floodplain of the planning area. There may be additional critical facilities and infrastructure exposed in the region that are not listed below.

Table 4-12: Critical Facilities and Infrastructure Exposed to 100-year Floodplain

Jurisdiction	Critical Facilities	Infrastructure Facilities
Calhan	N/A	2 Highway Bridges 1.33 miles of highway
Colorado Springs	4 Hazardous Material Sites 1 School 2 Wastewater Facilities	106 Highway Bridges 3 Rail Bridges 71 miles of Highway 12 miles natural gas pipeline 18 miles of rail line .13 square miles of reservoir
El Paso County	N/A	141 highway bridges 227 miles of highway 29 miles of gas pipelines 54 miles of rail line 1.28 sq mi of reservoir
Fountain	N/A	8 Highway bridges 2 Rail bridges 14 miles of highway 3.6 miles of natural gas pipeline .04 square miles of reservoir
Green Mtn Falls	N/A	1 Highway bridge
Manitou Springs	N/A	3 Highway bridges 4.2 miles of highway 0.27 miles of rail line
Monument	N/A	1 Highway bridge 1 Rail bridge 1.9 miles of highway 4.4 miles of rail .04 square miles of reservoir
Palmer Lake	N/A	3.2 Miles of highway 4.8 miles of rail .02 square miles of reservoir
Ramah	N/A	.31 miles of highway

4.6.1.4 Consequence Analysis

Flood Consequence Analysis	
Category	**Narrative**
Hazard Description	Most flooding events in the planning area have caused property damage, flooded roadways, and stalled vehicles. This damage is fairly limited in magnitude, as services are interrupted for brief periods, and there are few if any injuries. However, extreme flooding events, such as the floods of 1935, 2013, and 2015 are devastating. Multiple lives can be lost due to flash floods and/or slope failures. Multiple homes and businesses could be destroyed, and essential services could be compromised for long periods of time.
Impact to Property, Facilities, and Infrastructure	There are 2,056 structures in the 100-year special flood hazard area and 4,386 structures within the 500-year special flood hazard area. The market value of these parcels is over $481 million, which is 0.6% of the total market value of all parcels in the planning area. In addition, damage to private property would be expected, especially vehicles caught in moving water and smaller structures such as sheds/out buildings where the water inundates the property. Multiple areas within the county have exposure to infrastructure, which poses a threat to evacuation routes, distribution of goods and access to critical lifelines.
Impact on the Environment	Flooding and debris flow will damage or destroy the flood-control structures that have been installed over the years. Riparian vegetation will be displaced in many areas where erosion occurs. The possibility of damaged utility services in or near the inundation area may cause additional damage to the environment. Standing water in the post-inundation period would provide a breeding ground for disease-carrying insects. Damage to facilities that house hazardous materials is also a concern, especially when the materials are carried by the flood waters and affect the riparian and riverine ecosystems. Displaced animals and habitat destruction could be extensive; channel migration; hazardous materials contamination; homeless camp displacement (environment contamination); utility sewage water/sanitary sewer/storm water systems could all have a negative impact on the environment.
Impact on Responders	Flooded roadways and stalled vehicles would impede the ability of responders to navigate roadways in the affected areas. The sheer number of response requests could rapidly overwhelm the ability of local emergency services to respond and require requests for assistance from neighboring jurisdictions. Special training in water rescue, including “swift water” rescue tactics, techniques, and procedures, is needed in order to respond to flooding incidents and people who are trapped in moving water. Debris on the roads will impede the ability for responders to access people and will require heavy equipment, such as front end loaders, to clear the roadways. Need for evacuation support such as door-to-door notification and traffic management may increase responder risk; widespread flooding could stretch first responder personnel thin in some areas; potential impacts communications lines

	may affect ability to effectively respond. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by flooded roadways.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Potential for interruption of essential facilities and services for 24 to 72 hours. Damage to facilities/personnel in incident area may require temporary relocation of some operations.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses. Damage to facilities that house hazardous materials is also a concern, especially when the materials are carried by the flood waters and affect the riparian and riverine ecosystems. Damage to private property would be expected, especially vehicles caught in moving water and structures where the water inundates the property. The presence of debris in the flowing water—notably floating material, household and industrial chemicals, and suspended sediment in the flow—will increase the effects of the moving water and significantly amplify the dangers posed to people who are caught in the flows. Multiple lives can be lost if people are caught in the moving water. Public's ability to receive information about response and recovery efforts may be limited. Impacts on people will change with characteristics of event (e.g.), flash flood in a canyon, river flood on the plains, etc.); residents/property owners without flood insurance may be impacted greater than those with coverage; residents may be displaced due to evacuation, damage, or inaccessibility to homes; person(s) within flood areas have the potential for direct contact with hazardous materials; potential for drowning or personal injury; increased potential for exposure to disease.
Impact on the Economic Condition of the County	Disruption of the local economy is an anticipated consequence of major flooding. Although these events may cause building and infrastructure damage, the most detrimental short-term impact is caused by the loss of electric power which would impact businesses, government operations and residents. Without a relatively quick restoration of services, small businesses could close. Major disasters can create a "domino effect" that can hurt the economy. For example, major damage and loss to residential properties can lead to displacement of people. A decrease in population means loss of clientele for local businesses. Businesses may be destroyed or damaged to the degree that they cannot operate (whether short- or long-term). Even without initial major population relocation, business closings can contribute to reduced services, leading some to relocate in the short-term. Business closings and destruction or severe damage of facilities such as schools, libraries, and other public buildings may eliminate jobs (even in the short term) and may lead some people to leave the area.

	A lack of flood insurance for businesses could result in a catastrophic affect to the local economy. Flooding can have a greater economic impact than other natural disasters.
Impact on the Public Confidence in Government	The ability of the government to provide response and aid in recovery may be questioned and challenged if planning, response, and recovery are not timely and effective. Sharing information and details with the public about a power outage, for instance (damaged or complete loss of equipment as opposed to simple repair) allows residents to better understand why it may take an excessive amount of time before power and services are restored. Keeping the public well informed as to the extent of damage, status of repairs and providing realistic expectations may have a positive impact on the public's confidence level. Lack of communication can be mistaken for lack of action, resulting in frustration, anger and unrest.

4.6.1.5 Secondary Hazards

Secondary effects, such as blocking or destroyed roads, destroying homes and businesses, impacting critical facilities and disrupting supply chains and access are prevalent with riverine flooding in El Paso County. Bridge, water infrastructure, riparian ecosystems and flood control devices can also be substantially damaged and impact a community's ability to function.

4.6.1.6 Future Condition Impacts

Growth and development in El Paso County and incorporated communities have a high potential to encroach on the floodplain and in flood prone areas, putting additional lives and investments at risk. Property owners may apply pressure to develop their land to the fullest and highest potential, even when development and property are in high risk areas for flooding. The municipalities and County should put controls in place to ensure that they are reasonably protecting lives and investments in existing and future flood prone areas.

Drought and wildfire have both increased in frequency and magnitude in recent years. These will continue to adversely impact the vulnerabilities to flooding. It is anticipated that rain events may arrive with less consistency, yet also with increased frequency for events with greater amounts of precipitation. This scenario could exacerbate flood events.

4.6.1.7 Issues

The major issues for the flood hazard in the planning area are the following:

- Flash flooding that occurs with little or no warning will continue to impact the planning area.
- The duration and intensity of storms contributing to flooding issues may increase because of climate change.
- Flooding may be exacerbated by other hazards, such as wildfires, and may cause damages in areas not typically considered special flood hazard areas.
- Damages resulting from flood may impact tourism, which may have significant impacts on the local economy.

- The promotion of flood insurance as a means of protecting private property owners from the economic impacts of frequent flood events should continue.

4.6.2 DAM AND LEVEE FAILURE

4.6.2.1 Definition and Extent

Dams are man-made structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. Dams are typically constructed of earth, rock, concrete, or mine tailings. Although dam failure, either completely or partially, is a very rare event, when they occur, they are a significant hazard for communities downstream. Two factors that influence the potential severity of a full or partial dam failure are 1) the amount of water impounded and the density, type, and value of development and 2) infrastructure located downstream.

Dam failure occurs when the retention function of the dam is compromised, either in part or in its entirety. A dam failure is not the only type of emergency associated with dams. Spillway discharges that are large enough to cause flooding in downstream areas or flooding upstream of dams due to backwater effects or high pool levels are both considered dam emergencies and may cause significant property damage and loss of life.

Dam failures in the United States typically occur in one of four ways:

- Overtopping of the primary dam structure, which accounts for 34 percent of all dam failures, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage can also cause dam failure. These account for 30 percent of all dam failures.
- Failure due to piping and seepage accounts for 20 percent of all failures. These are caused by internal erosion due to piping and seepage, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.

DEFINITIONS

Dam: A man-made barrier, together with appurtenant structures, constructed above the natural surface of the ground for the purpose of impounding water. Flood control and storm runoff detention dams are included (2-CCR 402-1, Rule 4, Section 4.2.5).

Dam Failure: An uncontrolled release of impounded water due to structural deficiencies in dam.

High Hazard Dam: Dams where failure or operational error will probably cause loss of human life. (FEMA 333)

Significant Hazard Dam: Dams where failure or operational error will result in no probable loss of human life but can cause economic loss, environmental damage or disruption of lifeline facilities, or can impact other concerns. (FEMA 333)

Emergency Action Plan: A document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life.

Levee: An embankment built to prevent the overflow of water.

- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10 percent of all failures.

The remaining 6 percent of U.S. dam failures are due to miscellaneous causes. Many dam failures in the United States have been secondary results of other disasters. The prominent causes are earthquakes, landslides, extreme storms, massive snowmelt, equipment malfunction, structural damage, foundation failures, and sabotage.

Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

Dam failures result in a unique source of flash flooding, when a large amount of previously detained water is suddenly released into a previously dry area due to a failure in some way of the dam. Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, which can affect life and property.

Levees are natural or man-made embankments constructed along the banks of rivers, canals, and coastlines to protect adjacent lands from flooding by reinforcing the banks. Some levee systems were built for agricultural purposes and provide flood protection and flood loss reduction for farm fields and other land used for agricultural purposes. Urban levee systems are built to provide flood protection and flood loss reduction for population centers and the industrial, commercial, and residential facilities within them (FEMA 2009). Levees provide strong flood protection, but they are not failsafe. They are designed to protect against a specific flood level and could be overtopped during severe weather events.

A levee breach occurs when part of a levee gives way, creating an opening through which floodwaters may pass. A breach may occur gradually or suddenly. The most dangerous breaches happen quickly during periods of high water. The resulting torrent can quickly swamp a large area behind the failed levee with little or no warning.

Earthen levees can be damaged in several ways. For instance, strong river currents and waves can erode the surface. Debris and ice carried by floodwaters—and even large objects such as boats or barges—can collide with and gouge the levee. Trees growing on a levee can blow over, leaving a hole where the root wad and soil used to be. Burrowing animals can create holes that enable water to pass through a levee. If severe enough, any of these situations can lead to a zone of weakness that could cause a levee breach. In seismically active areas, earthquakes and ground shaking can cause a loss of soil strength, weakening a levee and possibly resulting in failure. In the rare occurrence when a levee system fails or is overtopped, severe flooding can occur due to increased elevation differences associated with levees and the increased water velocity that is created.

4.6.2.2 Previous Occurrences

El Paso County has never experienced the breach of a large-scale, significant dam; however, in September of 1929 after dam failures on Ute Pass Fish Club, a 15-foot wall of water killed one victim and destroyed a mountain resort.

4.6.2.3 Vulnerability

Table 4-13: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Unlikely	Minor	Limited	Minimal	Negligible	Low
Colorado Springs	Unlikely	Critical	Limited	Minimal	Minor	Moderate
El Paso County	Unlikely	Limited	Limited	Minimal	Minor	Moderate
Fountain	Unlikely	Limited	Limited	Minimal	Minor	Moderate
Green Mtn Falls	Unlikely	Limited	Limited	Minimal	Negligible	Low
Manitou Springs	Unlikely	Limited	Limited	Minimal	Minor	Moderate
Monument	Unlikely	Limited	Limited	Minimal	Negligible	Moderate
Palmer Lake	Unlikely	Minor	Limited	Minimal	Negligible	Low
Ramah	Unlikely	Minor	Limited	Minimal	Negligible	Low
Regionwide	Unlikely	Limited	Limited	Minimal	Minor	Moderate

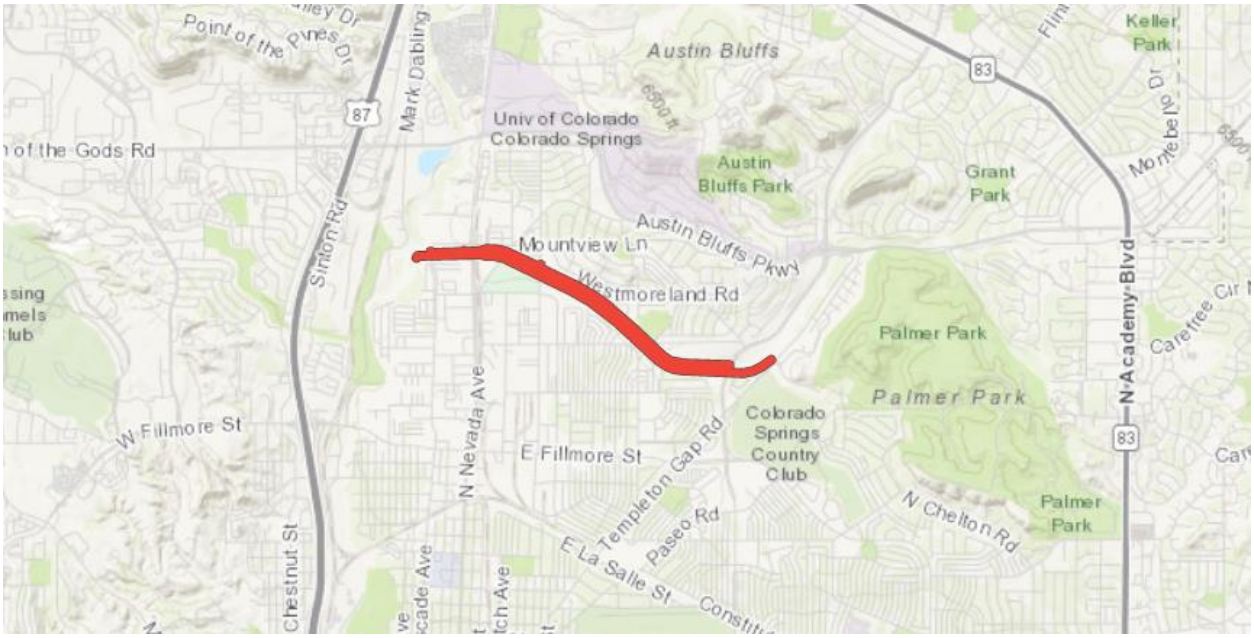
Spatial Extent and Geographic Location

Levees

The U.S. Army Corps of Engineers National Levee Database lists three known levees in El Paso County, all located in Colorado Springs: Templeton Gap Floodway, North Levee, Templeton Gap Floodway, South Levee and the Templeton Gap Floodway Levee 1. It is possible that there are additional levees located within the County that are not listed in this database. All levees were inspected in 2018 and the action items taken care of immediately following. Routine maintenance of the levees is performed by The City of Colorado Springs Operations & Maintenance Division on an annual basis to comply with the USACE inspection standards. The City is under contract to re-map the floodway to reflect current rainfall frequency and intensity data.

Figure 4-8 shows the approximate leveed area as shown in the U.S. Army Corps of Engineers National Levee Database and the inundation area associated with Templeton Gap Floodway is depicted on Figure 4-10.

Figure 4-8: Templeton Gap Floodway Map



Source: U.S. Army Corps of Engineers National Levee Database Interactive Map

Dams

HAZUS-MH contains a database of dams based on the National Inventory of Dams. This database lists 102 dams in the County. Dams are classified based on the potential loss of life and property to the downstream area resulting from failure or mis-operation of the dam or facilities, not from the condition or probability of the dam failing:

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

Based on these classifications, there are 28 high hazard, 13 significant hazard, 60 low hazard, and 1 dam classified as undetermined hazard in El Paso County. All dams with either a significant or high hazard potential are required to maintain an Emergency Action Plan (EAP). An EAP is defined as a plan of action to be taken to reduce the potential for property damage and loss of life in an area affected by a dam failure or large flood. The EAP contains inundation map exhibits to help emergency management authorities identify the critical areas for action in case of an emergency. Should an emergency arise, the dam owner should refer to preplanned EAP procedures for issuing an early warning and notifying downstream emergency management authorities of the situation.

Table 4-14 lists all the dams classified as high and significant hazard that could potentially impact the region. The locations of dams in the County are shown on Figure 4-9 and Figure 4-10. Most of these dams

are owned by Colorado Springs Utilities for local water supply and many are located upstream from residential communities, posing a significant risk.

Table 4-14: Unsatisfactory, High and Significant Hazard Dams in El Paso County

Dam Name	River	Near City	Max Storage (acre feet)	Hazard Class
Big Tooth	South Ruxton Creek	Manitou Springs	810	H
Bristlecone	Beaver Creek	Colorado Springs	2923	S
Chapel Hills #2	Monument-Tr	Colorado Springs	162	H
Crystal Creek	Crystal Creek	Green Mt Falls	6200	H
Curr	Fountain Creek-Tr	Colorado Springs	706	S
Fisher Canon	Fishers Canyon-Tr	Colorado Springs	62	H
Fishers Canyon Debris Basin Dam	Fishers Canyon Channel	Colorado Springs	28	H
Fountain Valley No 2	Fountain Creek-Tr	Widefield	4250	H
Glen Eyrie #3	Camp Creek-Os	Colorado Springs	205	H
Gold Camp	North Cheyenne Creek-Os	Colorado Springs	460	H
Highline	Monument Creek-Tr	Colorado Springs	91	H
Keeton Lake	Little Fountain Creek	Pueblo	48	S
Kettle Creek Diversion Dam	Kettle Creek	Colorado Springs	2700	H
Lake Moraine	Ruxton Creek	Manitou Springs	2150	H
Manitou	North Fork French Creek	Cascade	1100	H
Mccullough	West Monument Creek-Os	Colorado Springs	220	S
Monument Lake	Monument Creek	Monument	922	S
Non Potable Reservoir Dam 1	Lehman Run	Colorado Springs	95	S
Non Potable Reservoir Dam 2	Tr-Monument Cr - Offstream	Colorado Springs	215	H
Non Potable Reservoir Dam 3	Tr-Monument Cr - Offstream	Colorado Springs	70	H
Non Potable Reservoir Dam 4	Goat Camp Creek	Colorado Springs	150	S
Palmer Lake #2	N. Monument Ck	Palmer Lake	200	H
Palmer Lake #5	Camp Creek	Colorado Springs	172	S
Penrose	Spring Run-Tr	Colorado Springs	55	H
Pinon	Beaver Creek	Colorado Springs	188	S
Prospect Lake	Fountain Creek-Os	Colorado Springs	615	S
R. D. Nixon	Fountain Creek-Tr	Pueblo	1557	S
Ramah Det. And Rec.	Big Sandy Creek	Ramah	7641	S
Rampart	West Monument Creek	Colorado Springs		H
Regulating Reservoir	West Monument Creek-Tr	Colorado Springs	544	H
Sand Creek Detention Basin No. 6	Sand Creek	Colorado Springs	96	S
South Lake	Fountain Creek-Tr	Colorado Springs	583	H

Dam Name	River	Near City	Max Storage (acre feet)	Hazard Class
South Suburban	North Cheyenne Creek-Os	Colorado Springs	303	H
Spires Broadmoor North Debris Dam		Colorado Springs	12	H
Spires Broadmoor South Debris Dam			7	H
Spring Run #2	Spring Run	Colorado Springs	511	H
Stratton	North Cheyenne Creek	Colorado Springs	190	H
Valley No. 1	Camp Creek-Os	Colorado Springs	151	U
Valley No. 2	Camp Creek-Tr	Colorado Springs	252	U
Woodland Park	Loy Gulch	Woodland Park	67	H
Woodmoor Lake	Dirty Woman Creek-Tr	Monument	1350	H

Source: National Inventory of Dams

Valley No. 1 and Valley No. 2 dams are both in unsatisfactory condition. However, Bill McCormick, chief of dam safety for the Colorado Division of Water Resources, said downstream residents of the four local dams cited have no serious cause for concern.

"Those dams either no longer hold water," he said. "The high-risk designation refers to the potential of what could happen if a dam failed, but the failure of those dams is unlikely" (Interview, KRDO, 11-11-2019).

Figure 4-9: Dam and Levee Location by Hazard Classification, El Paso County

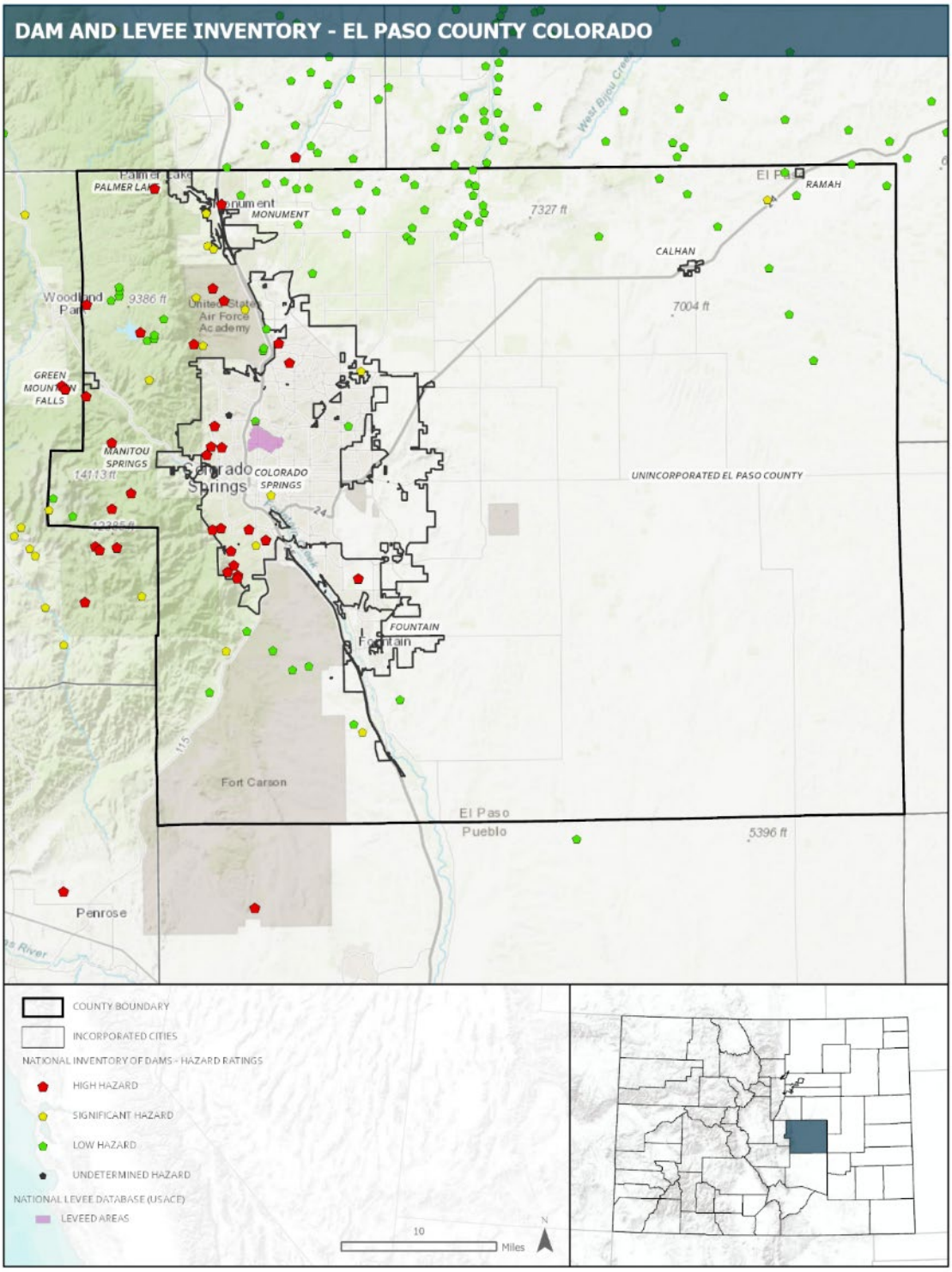
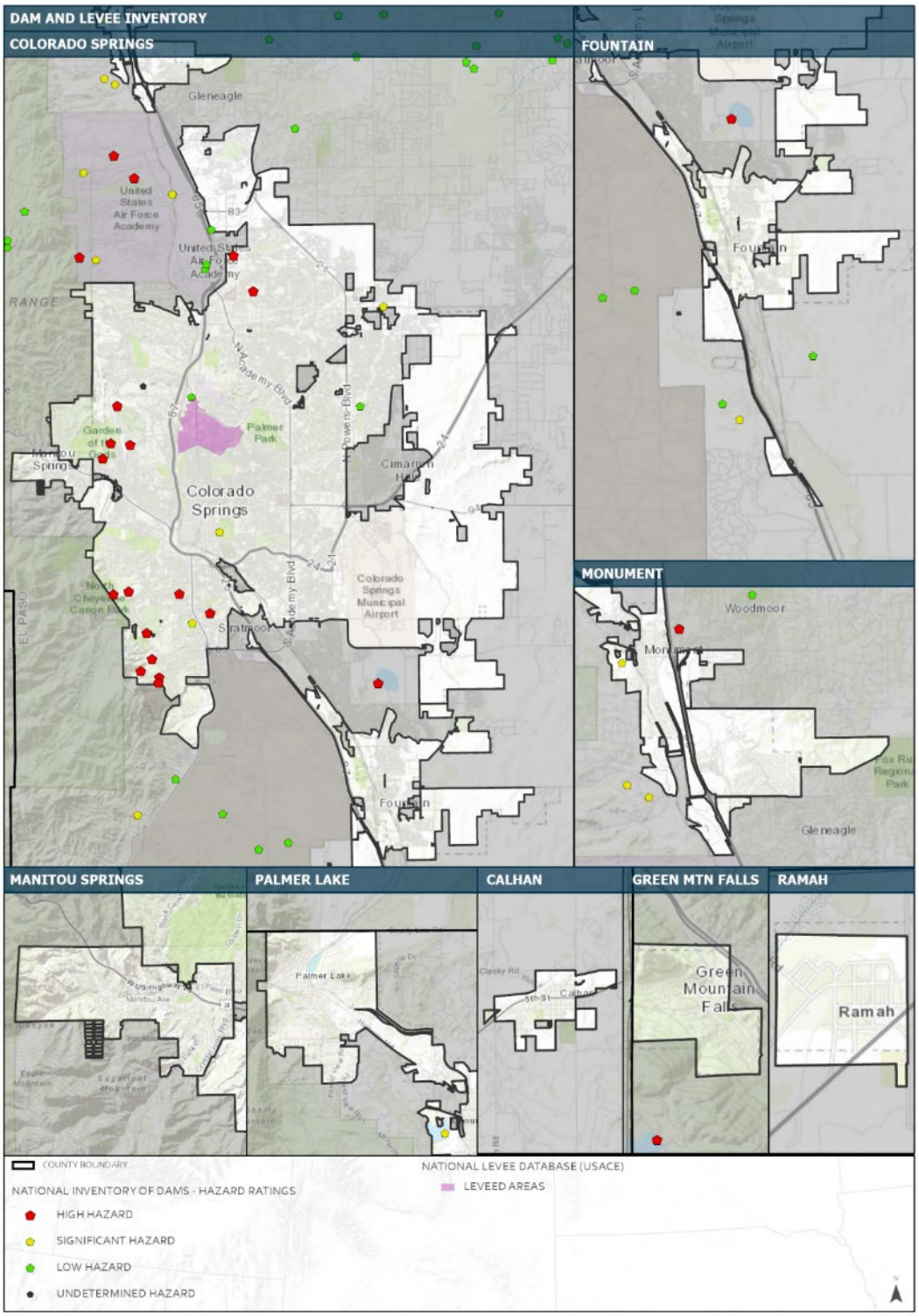


Figure 4-10: Dam and Levee Location by Hazard Classification, Participating Jurisdictions



Source: National Inventory of Dams

There are an uncounted number of 'non-jurisdictional' dams on public and private lands in the County. These are small dams that normally do not store water but may impound water during heavy precipitation events. Because they are not monitored or maintained, there is potential for them to overtop or fail and cause flooding and property damage during a significant rainfall event. The extent and risk associated with these dams is not known.

Probability of Future Occurrence

Unlikely: less than 1-percent chance of occurrence in any given year. Based on one occurrence of dam and levee failure in the past 85 years in El Paso County, it is estimated that there is a less than 1-percent chance of occurrence in any given year, or a recurrence interval of 100 years or more. However, it should be noted that the conditions of all private dams are unknown, and poor conditions may contribute to the likelihood of failure. Also, the average age of dams in the region is 65 years. With aging infrastructure, the likelihood of failure increases.

Magnitude / Severity

Catastrophic: If a dam or levee was to fail, the impact could be significant. Significant loss of life and injuries, significant property damage, and critical facilities could be disrupted for an extended period of time. However, due to the low probability of a dam or levee failure, the overall significance is considered **low**, with limited potential impact for jurisdictions in the eastern county and **moderate**, with some potential impact for jurisdictions in the foothills and mountainous regions that are in proximity to a dam breach inundation zone.

Warning Time

Minimal: Less than 6 hours. Warning time for dam failure varies depending on the cause of the failure. In events of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, there may be no warning time. A dam's structural type also affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until either the reservoir water is depleted or the breach resists further erosion. Concrete gravity dams also tend to have a partial breach as one or more monolith sections are forced apart by escaping water. The time of breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers, 1997).

El Paso County and its planning agencies have established protocols for flood warning and response to imminent dam failure in the flood warning portion of its adopted emergency operations plan. These protocols are tied to the emergency action plans created by the dam owners.

Exposure and Losses

Overall, dam failure impacts would likely be catastrophic in El Paso County, but the probability of such an event occurring is low. Exposure for both people and property would likely overlap flood inundation areas, but the boundaries of the dam inundation areas would likely be expanded. A dam failure could result in a significant number of fatalities if little to no warning time was available. Roads closed due to dam failure floods could result in serious transportation disruptions. A qualitative assessment of vulnerability is presented in the following sections.

Property

Vulnerable properties are those closest to the dam and levee inundation area. Colorado Springs Utilities does not have, nor maintain, data on the monetary value of property within an inundation zone. However, it is known that properties within the inundation area would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Transportation routes are vulnerable to dam inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Inundation maps should be included for each dam with an EAP. An inundation map illustrates which properties may be affected by floodwaters and shows the extent of flooding expected spatially within a geographic area. These maps will not be included in this Plan for security reasons, but remain on file with the owners of the dam associated with the EAP. Many EAPs remain on file with the Pikes Peak Regional OEM.

Population

Vulnerable populations are all populations downstream from dam and levee failures that are incapable of escaping the area within the allowable time frame. This includes children, elders, and disabled people who may be unable to get themselves out of the inundation area. The vulnerable population also includes those who would not have adequate warning from a television or radio emergency warning system. Potential for loss of life is determined by the capacity and number of evacuation routes available for residents in the inundation zone, and ability to provide timely warning.

The Colorado Division of Water Resources retains estimates on the Population at Risk (PAR) within an inundation zone. The Colorado Springs Utilities-owned dams that have the potential impacts to El Paso County are listed below.

Table 4-15:Estimated Potential Impact on Population in Dam Inundation Areas in El Paso County

Dam Name	Estimated Population at Risk
Rampart	23,293
South Catamount	1,000
North Catamount	9,202
Crystal Creek	2,414
Gold Camp	1,990
South Suburban	1,638
McCullough	31
Tesla	87
Highline	89
Penrose	95
Big Tooth	697
Lake Moraine	1,250

Nixon	19

➢ Environment

Reservoirs held behind dams affect many ecological aspects of a river. River topography and dynamics depend on a wide range of flows, but rivers below dams often experience long periods of very stable flow conditions or saw-tooth flow patterns caused by releases followed by no releases. Water releases from dams usually contain very little suspended sediment; this can lead to scouring of river beds and banks.

The environment would be vulnerable to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could result in destruction of downstream habitat and could have detrimental effects on many species of animals.

➢ Critical Facilities and Infrastructure

Critical infrastructure located within or close to the dam and levee inundation zone have the greatest potential to be impacted by the surge of water. Utilities such as overhead power lines, cable, and phone lines in the inundation zone are also vulnerable.

Inundation zones associated with the Rampart and North Catamount Dams, two large dams in the western county, primarily follow the path of Monument Creek and Fountain Creek. Critical resources and infrastructure that could be impacted by a breach of either dam, include the Pikes Peak Highway, Interstate 25 and US Highway 24, the Pikes Peak Regional Office of Emergency Management, several schools and a hospital, the Air Force Academy, and a wastewater treatment plant.

4.6.2.4 Consequence Analysis

Dam and Levee Failure Consequence Analysis	
Category	**Narrative**
Hazard Description	The consequences of dam and/or levee failure mirror the consequences that would be experienced during a severe flood event. Dams are classified based on the potential loss of life and property to the downstream area resulting from failure of the dam or facilities, not from the condition or probability of the dam failing. The classifications include: • High Hazard Potential: Probable loss of life (one or more) • Significant Hazard Potential: No probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns; often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure • Low Hazard Potential: No probable loss of human life and low economic and/or environmental losses; losses are principally limited to the owner's property.

	Of the known dams in El Paso County, 28 are classified as high hazard, 13 are classified as significant hazard, and 60 are low hazard. Levees are designed to provide a specific level of flood protection. No levee system provides full protection from all flooding events to the people and structures located behind it. Some level of flood risk exists in these levee-impacted areas (FEMA 2009). There are three levees in the Pikes Peak Region, all in the City of Colorado Springs.
Impact to Property, Facilities, and Infrastructure	Property destroyed and severely damaged; and/or interruption of essential facilities and service for more than 72 hours. Damage to private property would be expected, especially vehicles caught in moving water and smaller structures such as sheds/out buildings where the water inundates the property. There are multiple essential facilities and infrastructure located within inundation zones, including the Pikes Peak Highway, Interstate 25 and US Highway 24, the Pikes Peak Regional Office of Emergency Management, several schools and a hospital, the Air Force Academy, and a wastewater treatment plant. Loss of sections of roadways would require emergency response equipment to take detours and delay the response times.
Impact on the Environment	Flooding will damage or destroy the flood-control structures that have been installed over the years. Riparian vegetation will be displaced in many areas where erosion occurs. The possibility of damaged utility services in or near the inundation area may cause additional damage to the environment. Standing water in the post-inundation period would provide a breeding ground for disease-carrying insects. Damage to facilities that house hazardous materials is also a concern, especially when the materials are carried by the flood waters and affect the riparian and riverine ecosystems. Additional sediment would also result in the local water supply.
Impact on Responders	Flooded roadways and stalled vehicles would impede the ability of responders to navigate roadways in the affected areas. The sheer number of response requests could rapidly overwhelm the ability of local emergency services to respond and require requests for assistance from neighboring jurisdictions. Special training in water rescue, including “swift water” rescue tactics, techniques, and procedures, is needed in order to respond to flooding incidents and people who are trapped in moving water. Need for evacuation support such as door-to-door notification and traffic management may increase responder risk; widespread flooding could stretch first responder personnel thin in some areas; potential impacts communications lines may affect ability to effectively respond. The presence of hazardous materials in the affected areas where first responders are called may put personnel at risk for exposure. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by flooded roadways.
Impact on Continuity of Operations, Continuity of	Loss of facilities or infrastructure for the provision of government services is expected. Possible short-term accessibility issues for first responders performing routine duties or personnel reporting to work locations. Damage to

Government, and Delivery of Services	facilities/personnel in incident area may require temporary relocation of some operations.
Impact on the Public	Multiple deaths and injuries. Damage to private property would be expected, especially vehicles caught in moving water and structures where the water inundates the property. Multiple lives can be lost if people are caught in the moving water. Residents may be displaced due to evacuation, damage, or inaccessibility to homes; person(s) within flood areas have the potential for direct contact with hazardous materials; potential for drowning or personal injury; increased potential for exposure to disease.
Impact on the Economic Condition of the County	Disruption of the local economy is an anticipated consequence of major flooding. Although these events may cause building and infrastructure damage, the most detrimental short-term impact is caused by the loss of electric power which would impact businesses, government operations and residents. Without a relatively quick restoration of services, small businesses could close. Major disasters can create a "domino effect" that can hurt the economy. For example, major damage and loss to residential properties can lead to displacement of people. A decrease in population means loss of clientele for local businesses. Businesses may be destroyed or damaged to the degree that they cannot operate (whether short- or long-term). Even without initial major population relocation, business closings can contribute to reduced services, leading some to relocate in the short-term. Business closings and destruction or severe damage of facilities such as schools, libraries, and other public buildings may eliminate jobs (even in the short term) and may lead some people to leave the area.
Impact on the Public Confidence in Government	The ability of the government to provide response and aid in recovery may be questioned and challenged if planning, response, and recovery are not timely and effective. Sharing information and details with the public about a power outage, for instance (damaged or complete loss of equipment as opposed to simple repair) allows residents to better understand why it may take an excessive amount of time before power and services are restored. Keeping the public well informed as to the extent of damage, status of repairs and providing realistic expectations may have a positive impact on the public's confidence level.

4.6.2.5 Secondary Hazards

Dam failure can cause severe downstream flooding, depending on the magnitude of the failure. Other potential secondary hazards of dam failure are landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

4.6.2.6 Future Condition Impacts

Area planning agencies have established comprehensive policies regarding sound land use in identified flood hazard areas. While some of the areas vulnerable to the more severe impacts from dam failure intersect the mapped flood hazard areas, the inundation areas from a dam failure cover a much larger portion of the planning area. Flood-related policies in these comprehensive plans and in the local

municipal code will help to reduce the risk associated with the dam failure hazard for development in the planning area, but will be unlikely to help reduce risk to all structures within the dam inundation area.

Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle or due to earlier seasonal snowmelt in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream. Throughout the west, communities downstream of dams are already seeing increases in stream flows from earlier releases from dams.

Dams are constructed with safety features known as "spillways." Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

4.6.2.7 Issues

The most significant issue associated with dam failure involves the properties and populations in the inundation zones. Flooding as a result of a dam failure would significantly impact these areas. There is often limited warning time for dam failure. These events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Important issues associated with dam failure hazards include the following:

- Federally regulated dams have an adequate level of oversight and sophistication in the development of emergency action plans for public notification in the unlikely event of failure. However, the protocol for notification of downstream citizens of imminent failure needs to be tied to local emergency operations planning.
- Mapping for federally regulated dams is already required and available; however, mapping for non-federal-regulated dams that estimates inundation depths is needed to better assess the risk associated with dam failure from these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For non-federal-regulated dams, mapping of dam failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can be valuable to emergency managers and community officials downstream of these facilities. This type of mapping can illustrate areas potentially impacted by more frequent events to support emergency response and preparedness.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.
- Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

4.6.3 MUD OR DEBRIS FLOW

4.6.3.1 Definition and Extent

According to the Colorado Geological Survey, a mud flow is a mass of water and fine-grained earth that flows down a stream, ravine, canyon, arroyo, or gulch. If more than half of the solids in the mass are larger than sand grains-rocks, stones, boulders—the event is called a debris flow. The mud and debris flow problem can be exacerbated by wildfires that remove vegetation that serves to stabilize soil from erosion. Heavy rains on the denuded landscape can lead to rapid development of destructive mud flows.

DEFINITIONS

Mud Flow: A mass of water and fine-grained earth that flows down a stream, ravine, canyon, arroyo, or gulch.

Debris Flow: A mud flow where more than half of the solids in the mass are larger than sand grains.

Debris Fan: A conical landform produced by successive mud and debris flow deposits, and the likely spot for future events.

Soil slumps or slides can liquefy during intense rainfall events, especially on already saturated soils. Multiple debris flows can funnel into channels as they flow down a hillside. These flows can accelerate to speeds as great as 35 miles per hour and travel long distances from their source (USGS, 2000). Although flows originate on steep slopes, once started they can travel over gently sloping terrain. It is common for flows to begin in depressions at the top of small gullies, known as swales. Areas downslope from swales are considered to be particularly hazardous (USGS, 2000). Additional areas susceptible to debris flows include roadcuts or other slope areas that have been altered and areas where surface runoff is channeled (USGS, 2000). Flows in areas that have been modified, such as roadways, may occur during less intense rainfall situations than those required for undisturbed areas (USGS, 2000).

4.6.3.2 Previous Occurrences

El Paso county has experienced several instances of mud or debris flows. Several significant events are described below.

- 1999 - Flood, mud flow and landslide events in El Paso County caused over $30 million in infrastructure and property damage, including road repairs and twisted utility lines. Several residences were condemned as a result and a Presidential Disaster Declaration was issued (CO OEM, 2013).
- July, 2012 - A large mud flow on July 30, 2012 blocked U.S. Highway 24 at Wellington Gulch (Figure 4-11). The flow occurred after approximately 1.75 inches of rain fell on the Waldo Canyon burn scar. The highway was closed all night as crews from the Colorado Department of Transportation removed hundreds of truckloads of mud.
- June, 2013 - A debris flow occurred on U.S. Highway 24 after a thunderstorm dropped 0.32 to 1.06 inches of rainfall on the Waldo Canyon burn scar. No injuries were reported; however, a four mile stretch of Highway 24 was closed (Associated Press, 2013).

- August, 2013 - A large mudflow occurred along U.S. Highway 24 between Cascade and Manitou Springs after approximately 1.3 inches of rain fell in about half an hour on the Waldo Canyon fire burn scar (Figure 4-12). The event resulted in at least one fatality (Lackey, 2013). Water, debris and mud also entered the downtown area of Manitou Springs causing significant damage to 6 buildings and some damage to eleven additional structures. Approximately 40 vehicles were swept away by the floodwater and mud flow (Coffman, 2013).
- August, 2015 – After a storm on August 10, 2015, lack of vegetation sent mud and debris left in the wake of the Waldo Canyon fire down streets and into drainages and culverts. The Alpine Autism Center on Fieldstone Road in the Mountain Shadows neighborhood suffered damage from the flooding (Figure 4-13).

Figure 4-11: U.S. Highway 24 Covered by a Mud Flow, July 30, 2012

Source: Photo by Gerhard Heller, CDOT

Figure 4-12: Flooding and Debris Flow in Manitou Springs, August 2013

Source: The Denver Post

Figure 4-13: The Alpine Autism Center in the Mountain Shadows neighborhood suffered damage from flooding during August 2015 storm

Source: Jerilee Bennett, The Gazette

4.6.3.3 Vulnerability

Table 4-16: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Unlikely	NA	NA	NA	Negligible	Negligible
Colorado Springs	Likely	Critical	Limited	Minimal	Moderate	High
El Paso County	Occasional	Critical	Limited	Minimal	Moderate	Moderate
Fountain	Occasional	Minor	Limited	Minimal	Negligible	Low
Green Mtn Falls	Occasional	Critical	Moderate	Minimal	Moderate	High
Manitou Springs	Likely	Critical	Limited	Minimal	Moderate	High
Monument	Occasional	Minor	Minor	Minimal	Negligible	Low
Palmer Lake	Occasional	Critical	Limited	Minimal	Moderate	High
Ramah	Unlikely	NA	NA	NA	Negligible	Negligible
Regionwide	Occasional	Critical	Limited	Minimal	Moderate	Moderate

Spatial Extent and Geographic Location

Mud and debris flows occur across Colorado on an on-going basis. Most flows occur on areas with steep slopes and generally occurs more frequently in the more mountainous areas of the County. The best available predictor of where flows might occur is the location of past movements. The most hazardous areas for mud and debris flow events are canyon bottoms, stream channels, areas near the outlets of canyons, and slopes excavated for buildings and roads (USGS, 2000).

Wildfires greatly increase the threat of mud or debris flows, so areas downslope of recent burn scars are more likely to experience mud flow events.

Figure 4-14 shows the estimated probability of a post-wildfire debris flow for the Waldo Canyon fire burn scar and Figure 4-15 shows the estimated potential volume of a debris flow occurring in the same area.

Figure 4-14: Estimated Probability of Potential Post-Wildfire Debris Flows in the 2012 Waldo Canyon Burn Area near Colorado Springs

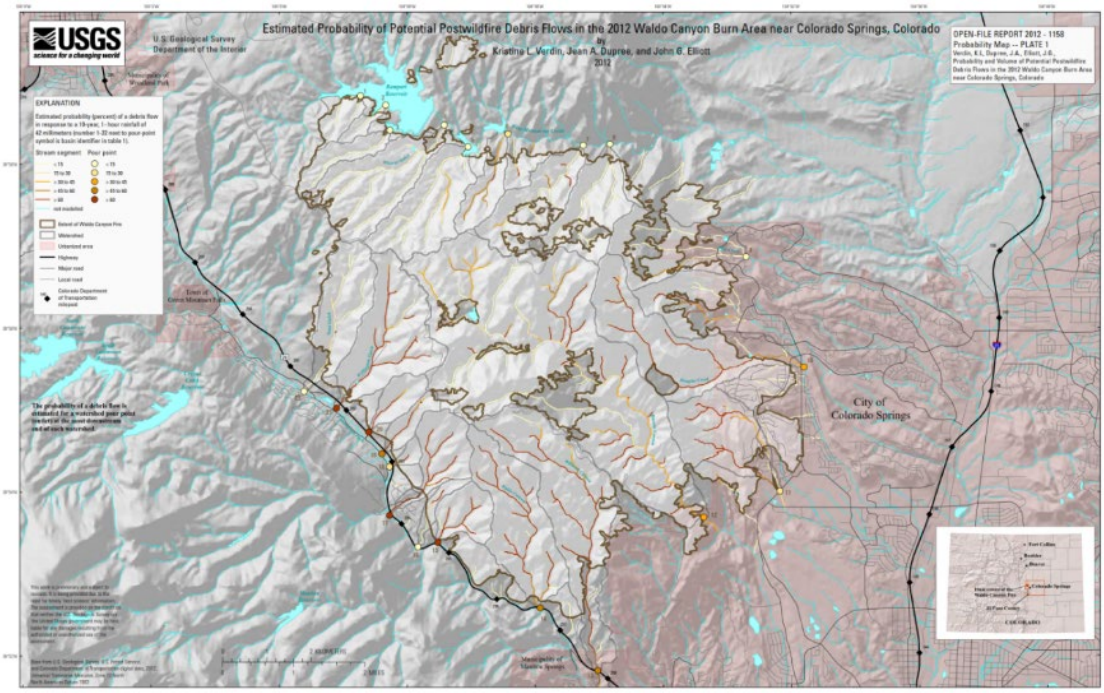


Figure 4-15: Estimated Volume of Potential Post-Wildfire Debris Flows in the 2012 Waldo Canyon Burn Area near Colorado Springs

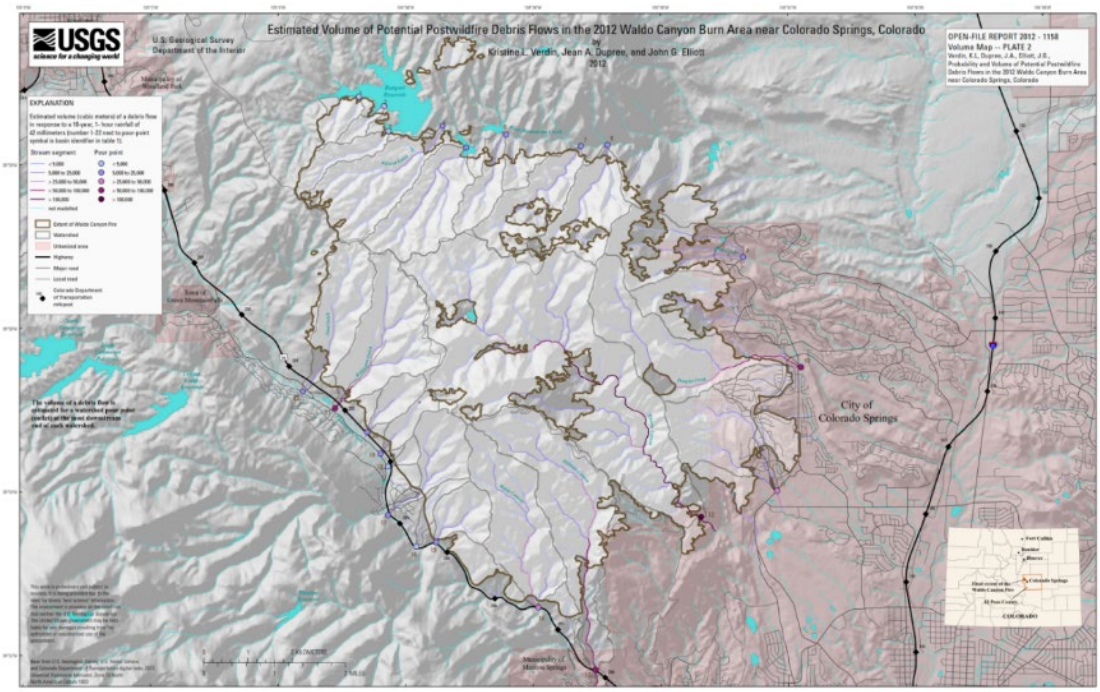


Figure 4-16 and Figure 4-17 show the geographic extents exposed to mud and debris flow susceptibility areas for El Paso County and the participating jurisdictions, respectively. Table 4-17 identifies the acreage and percent of area by jurisdiction exposed to mud or debris flow hazard.

Figure 4-16: Potential Areas of Mud and Debris Flow Susceptibility, El Paso County

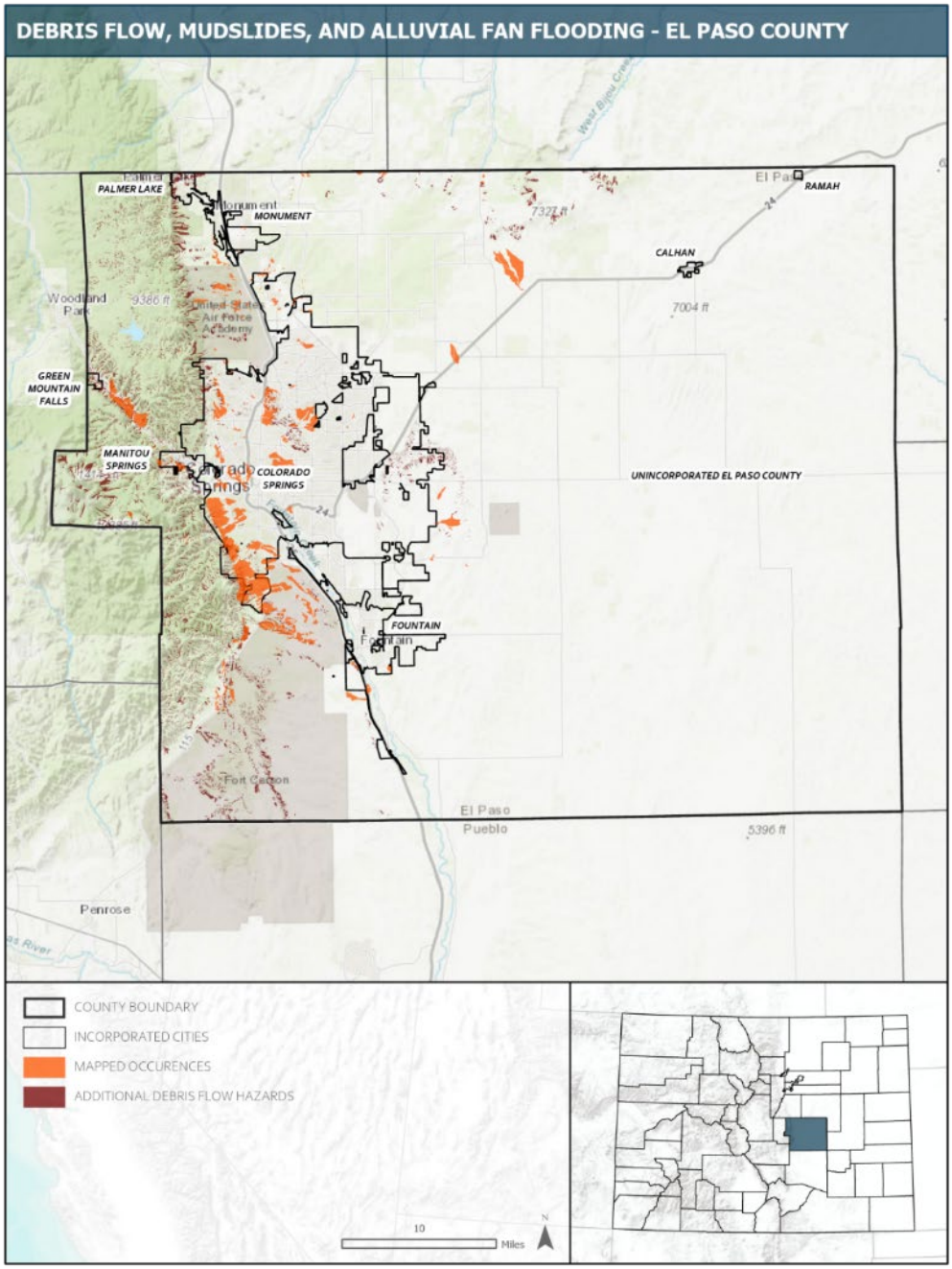


Figure 4-17: Potential Areas of Mud or Debris Flow Susceptibility, Participating Jurisdictions

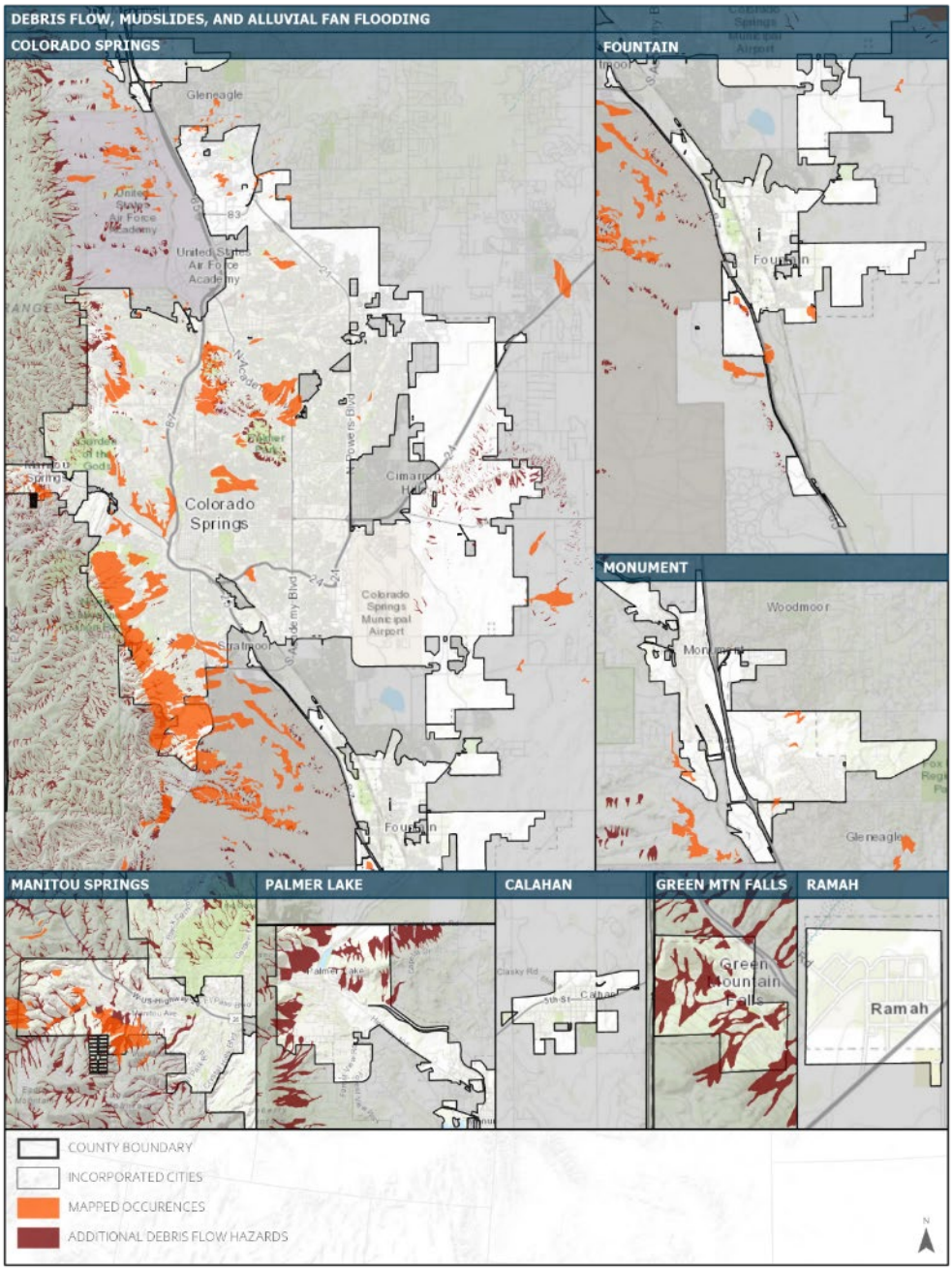


Table 4-17: Acreage and Percent of Area by Jurisdiction Exposed to Mud or Debris Flow Hazard

Jurisdiction	Total Exposed Area (Acres)	Total Exposed Area (%)
Calhan	0	0%
Colorado Springs	18,816	12%
El Paso County	40,512	3%
Fountain	320	2%
Green Mountain Falls	192	28%
Manitou Springs	512	21%
Monument	64	1%
Palmer Lake	512	19%
Ramah	0	0%
Regionwide	**60,864**	**4.5%**

Probability of Future Occurrence

Based on the previous occurrences noted above, the probability of mud or debris flow events are **occasional**, with a 1- to 25-percent chance of occurrence in any given year. Manitou Springs and Colorado Spring have experienced several debris flow events in the lasts 10 years, as such, the probability of future occurrence for the two aforementioned jurisdictions is anticipated to be **likely**, with a 25- to 75-percent chance of occurrence in any given year.

Magnitude / Severity

Mud and debris flows destroy property and infrastructure and can take the lives of people. Slope failures in the United States result in an average of 25 lives lost per year and an annual cost to society of about $1.5 billion. Based on the information in this hazard profile the magnitude/severity of mud or debris flow for jurisdictions with exposure to the mud and debris flow hazard is **critical**—isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

Warning Time

Minimal – less than 6 hours. In general, there is usually little to no warning time for specific mud or debris flow events. However, such events usually occur concurrently with other hazards such as floods or severe storms. While individual events cannot be predicted, areas where such events are likely to occur are identifiable. Flood and severe storm warnings can be useful indicators to area residents of when mud or debris flow events may occur; however, it is important for residents to remember that wildfire burn scars are able to produce flows even with moderate levels of precipitation.

Exposure and Losses

➢ Property

Property located near steep slopes or downslope from wildfire burn scars is exposed to mud and debris flow hazards. All property exposed to the mud and debris flow hazard is vulnerable. Structural damage

can range from minor damage to total destruction. Damage to structures in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction.

There are 14,944 structures within the identified mud and debris flow susceptibility areas defined in Figure 4-16: Potential Areas of Mud and Debris Flow Susceptibility, El Paso County. Table 4-18 lists the total market valuation of exposed structures.

Table 4-18: Structure Exposure within Identified Mud and Debris Flow Susceptibility Areas

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Exposed Structure Market Valuation ($)			
			10% Damage	30% Damage	50% Damage	100% Damage
Calhan	0	0%	NA	NA	NA	NA
Colorado Springs	11,856	9%	$449,377,002	$1,348,131,006	$2,246,885,010	$4,493,770,021
El Paso County	2,105	3%	$45,850,820	$137,552,461	$229254101	$458,508,203
Fountain	1	0%	$2,691	$8,072	$13,453	$26,906
Green Mtn Falls	112	30%	$2,529,050	$7,587,149	$12,645,248	$25,290,496
Manitou Springs	528	25%	$13,840,784	$41,522,352	$69,203,919	$138,407,839
Monument	3	0%	$333,447	$10,00,341	$1,667,236	$3,334,471
Palmer Lake	339	27%	$8,096,456	$24,289,368	$40,482,279	$80,964,559
Ramah	0	0%	NA	NA	NA	NA
Regionwide	**14,944**	**7%**	**$520,030,249**	**$1,560,090,748**	**$2,600,151,247**	**$5,200,302,495**

➢ Population

People living or working near steep slopes are exposed to mud and debris flows hazards. Individuals travelling on roads that cut through mountainous terrain or recreating in such areas are also exposed. Residents living downslope of wildfire burn scars are also exposed to mud and debris flow hazards.

All persons exposed to mud and debris flow hazards are vulnerable. Populations with mobility issues, the elderly and young populations may be more vulnerable as there is usually little warning for such events and these individuals may have difficulty moving out of the path of a flow. Table 4-19 identifies the number of people residing in mud and debris flow susceptibility areas by jurisdiction.

Table 4-19: Population Exposed to Mud and Debris Flow Susceptibility Areas

	Total Exposed Population Count	Total Exposed Population (%)
Calhan	0	0%
Colorado Springs	35,209	8%
El Paso County	2,672	2%
Fountain	0	0%
Green Mountain Falls	203	30%
Manitou Springs	1,260	25%
Monument	0	0%

Palmer Lake	674	27%
Ramah	0	0%
Regionwide	**40,019**	**7%**

Environment

Environmental problems as a result of mud and debris flows can be numerous. Flows that fall into streams may significantly impact fish and wildlife habitat, as well as affecting water quality. Hillsides that provide wildlife habitat can be lost for prolonged periods of time due to mud or debris flows.

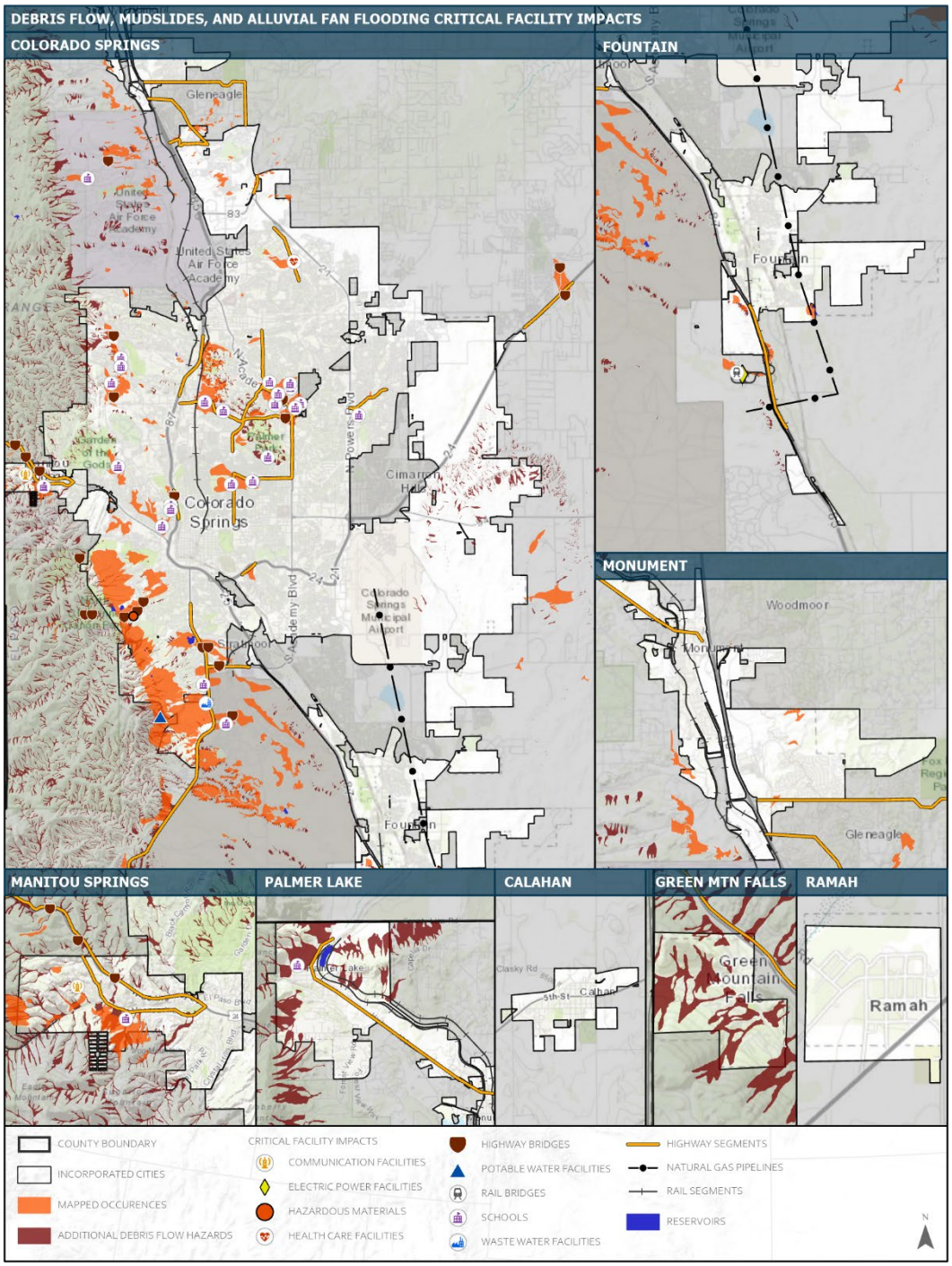
Critical Facilities and Infrastructure

A significant amount of critical facilities and infrastructure can be exposed to mud and debris flows:

- **Roads**—Flows can block egress and ingress on roads, causing isolation for neighborhoods, traffic problems and delays for public and private transportation. This can result in economic losses for businesses.
- **Bridges**—Flows can significantly impact road bridges. Mud and debris can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use.
- **Power Lines**—Power lines are generally elevated above steep slopes; the towers supporting them can be subject to mud or debris flows. A flow could trigger failure of the soil underneath a tower, causing it to collapse and ripping down the lines. Power and communication failures due to landslides can create problems for vulnerable populations and businesses.
- **Water Supply and Distribution Systems**—Large amounts of debris that wash into streams can clog reservoirs, pipelines, or treatment facilities

Several types of infrastructure are exposed to mass movements, including transportation, water and sewer and power infrastructure. Highly susceptible areas of the county include mountain roads and transportation infrastructure. Figure 4-18 identifies critical facilities and infrastructure exposed to mud and debris flow susceptibility areas.

Figure 4-18: Critical Facilities & Infrastructure Exposed to Mud or Debris Flow Susceptibility Areas, Participating Jurisdictions



4.6.3.4 Consequence Analysis

Mud and Debris Flow Consequence Analysis	
Category	**Narrative**
Hazard Description	Locations downhill and downstream from existing and future burn scars are susceptible to flash flooding and debris flows, especially near steep terrain. Rain storms that develop over burn areas can produce flash flooding and debris flows nearly as fast as National Weather Service radar can detect the rainfall. If heavy rainfall is observed even for a very short time there is the potential for flash flooding and/or debris flows.
Impact to Property, Facilities, and Infrastructure	Major or long-term property damage that threatens structural stability. Although these events may cause building and infrastructure damage, the most detrimental short-term impact is caused by the loss of electric power which would impact businesses, government operations and residents. Loss of sections of roadways would require emergency response equipment to take detours and delay the response times. Transportation infrastructure would also be impacted causing delays in emergency response.
Impact on the Environment	Mud and debris flows will damage or destroy the flood-control structures that have been installed over the years. Riparian vegetation will be displaced in many areas where erosion occurs. The possibility of damaged utility services in or near the inundation area may cause additional damage to the environment. Standing water in the post-inundation period would provide a breeding ground for disease-carrying insects. Damage to facilities that house hazardous materials is also a concern, especially when the materials are carried by the flood waters and affect the riparian and riverine ecosystems. Displaced animals and habitat destruction could be extensive; channel migration; hazardous materials contamination; homeless camp displacement (environment contamination); utility sewage water/sanitary sewer/storm water systems could all have a negative impact on the environment.
Impact on Responders	Flooded roadways and stalled vehicles would impede the ability of responders to navigate roadways in the affected areas. The sheer number of response requests could rapidly overwhelm the ability of local emergency services to respond and require requests for assistance from neighboring jurisdictions. Special training in water rescue, including “swift water” rescue tactics, techniques, and procedures, is needed in order to respond to flooding incidents and people who are trapped in moving water. Debris on the roads will impede the ability for responders to access people and will require heavy equipment, such as front end loaders, to clear the roadways. Need for evacuation support such as door-to-door notification and traffic management may increase responder risk; widespread flooding could stretch first responder personnel thin in some areas; potential impacts communications lines may affect ability to effectively respond. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder

	families could cause additional risk to responders. Ambulance services would also be impacted by flooded roadways.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Interruption of essential facilities and services for 24-72 hours. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from flooding and debris flow.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses. Damage to facilities that house hazardous materials is also a concern, especially when the materials are carried by the flood waters and affect the riparian and riverine ecosystems. Damage to private property would be expected, especially vehicles caught in moving water and structures where the water inundates the property. The presence of debris in the flowing water—notably floating material, household and industrial chemicals, and suspended sediment in the flow—will increase the effects of the moving water and significantly amplify the dangers posed to people who are caught in the flows. Multiple lives can be lost if people are caught in the moving water. Public's ability to receive information about response and recovery efforts may be limited. Residents may be displaced due to evacuation, damage, or inaccessibility to homes; person(s) within flood areas have the potential for direct contact with hazardous materials; potential for drowning or personal injury; increased potential for exposure to disease.
Impact on the Economic Condition of the County	Disruption of the local economy is an anticipated consequence of major flooding. Although these events may cause building and infrastructure damage, the most detrimental short-term impact is caused by the loss of electric power which would impact businesses, government operations and residents. Without a relatively quick restoration of services, small businesses could close. Major disasters can create a "domino effect" that can hurt the economy. For example, major damage and loss to residential properties can lead to displacement of people. A decrease in population means loss of clientele for local businesses. Businesses may be destroyed or damaged to the degree that they cannot operate (whether short- or long-term). Even without initial major population relocation, business closings can contribute to reduced services, leading some to relocate in the short-term. Business closings and destruction or severe damage of facilities such as schools, libraries, and other public buildings may eliminate jobs (even in the short term) and may lead some people to leave the area. A lack of flood insurance for businesses could result in a catastrophic affect to the local economy.
Impact on the Public Confidence in Government	The ability of the government to provide response and aid in recovery may be questioned and challenged if planning, response, and recovery are not timely and effective. Sharing information and details with the public about a power outage, for instance (damaged or complete loss of equipment as opposed to simple repair)

	allows residents to better understand why it may take an excessive amount of time before power and services are restored. Keeping the public well informed as to the extent of damage, status of repairs and providing realistic expectations may have a positive impact on the public's confidence level.

4.6.3.5 Secondary Hazards

Mud and debris flows can cause several types of secondary effects, such as blocking access to roads, which can isolate residents and businesses and delay commercial, public, and private transportation. This could result in economic losses for businesses. Other potential problems resulting from mud and debris flows are power and communication failures. Vegetation or poles on slopes can be knocked over, resulting in possible losses to power and communication lines. Flows also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. They also can damage rivers or streams, potentially harming water quality, fisheries, and spawning habitat.

4.6.3.6 Future Condition Impacts

The region is experiencing moderate growth and this growth is expected to continue in the coming decades. More development may increase the number of persons and structures exposed to mud and debris flow hazards. Land use planning and permit authorization conducted by the County and incorporated areas can be used to guide development away from flow-prone areas. The City of Manitou Springs recently adopted new ordinances to strengthen natural hazard-related requirements, defining standards to reduce risk from flooding, geologic hazards, and wildfire. The City of Colorado Springs has established overlays to regulate hillside development in areas with unstable or potentially unstable slopes, areas with previous mining activity, or areas that exhibit other geologic hazards that could potentially compromise structures.

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Increase in global temperature could affect the snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All of these factors would increase the probability for mud and debris flow occurrences.

4.6.3.7 Issues

Important issues associated with mud and debris flow in the planning area include the following:

- It is likely that there are existing homes in mud and debris flow risk areas throughout the County. The degree of vulnerability of these structures depends on the codes and standards the structures were constructed to. Information to this level of detail is not currently available.
- As incidents of wildfires increase, and hillsides are void of vegetation, rain-soaked hillsides are more likely to slide resulting in increased damage countywide.
- Future development could lead to more homes in mud and debris flow risk areas.
- Mapping and assessment of mud and debris flow hazards are constantly evolving. As new data and science become available, assessments of risk should be reevaluated.

- The impact of climate change is uncertain.
- Mud and debris flows may cause negative environmental consequences, including water quality degradation.
- The risk associated with the mud and debris flow hazard overlaps the risk associated with other hazards such as flood and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.

4.7 SEVERE WEATHER

Severe weather hazards refer to dangerous and/or damaging meteorological events resulting from weather systems or prolonged climate patterns which include the following for El Paso County and the participating jurisdictions:

- Hail
- Drought
- Lightning
- Tornado
- Wind
- Winter Storm

4.7.1 HAIL

4.7.1.1 Definition and Extent

Hail is precipitation that is formed when updrafts in severe storms carry raindrops upward into extremely cold areas of the atmosphere. The super cooled raindrops grow into balls of ice, which pose a hazard to property, people, livestock, and crops when they fall back to the earth. The process of falling, thawing, moving up into the updraft and refreezing before falling again may repeat many times, increasing the size of the hailstone. Usually hailstones are less than 2" in diameter but have been reported much larger and may fall at speeds of up to 120 mph. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. These events are often associated with thunderstorms that may also cause high winds and tornadoes. Hail causes nearly $1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the National Weather Service uses to classify thunderstorms as 'severe.' If hailstones of more than one inch in diameter are produced in a thunderstorm, the storm qualifies as severe.

DEFINITIONS

Hail: Precipitation that is formed when updrafts in severe storms carry raindrops upward into extremely cold areas of the atmosphere.

Thunderstorm: A storm featuring heavy rains, strong winds, thunder, and lightning, typically about 15 miles in diameter and lasting about 30 minutes. Hail and tornadoes are also dangers associated with thunderstorms. Lightning is a serious threat to human life. Heavy rains over a small area in a short time can lead to flash flooding.

Large hailstones are capable of damaging structures, automobiles, and harming individuals and livestock. Table 4-20 documents the typical damage associated with various intensity categories of hailstones.

Table 4-20: Torro Hailstorm Intensity Scale

Intensity Category	Diameter (in.)	Size Description	Typical Damage Impacts
Hard Hail	0.2-0.4	Pea	No damage
Potentially Damaging	0.4-0.6	Mothball	Slight general damage to plants, crops

Intensity Category	Diameter (in.)	Size Description	Typical Damage Impacts
Significant	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	1.6-2.0	Golf ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	3.0-3.5	Large orange > Soft ball	Severe damage to aircraft bodywork
Super Hailstorms	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organisation (TORRO), Department of Geography, Oxford Brookes University.

Hailstorms occur during severe storms, which are regional in nature. However, just as the amount of precipitation in the form of snow or rain may vary significantly within a single storm, so may the amount, size, and duration of hail within a severe storm. This can have a wide range of impacts.

4.7.1.2 Previous Occurrences

The National Climatic Data Center's Storm Events Database lists over 500 hail events in El Paso County between 2001 and 2019, of those events, 70 were reported with hail measuring 2 inches or larger in diameter. A partial list of events is noted in Table 4-21. The locations and size of hail events over 1.2 inches in diameter from 1955 through 2018 are shown on Figure 4-19.

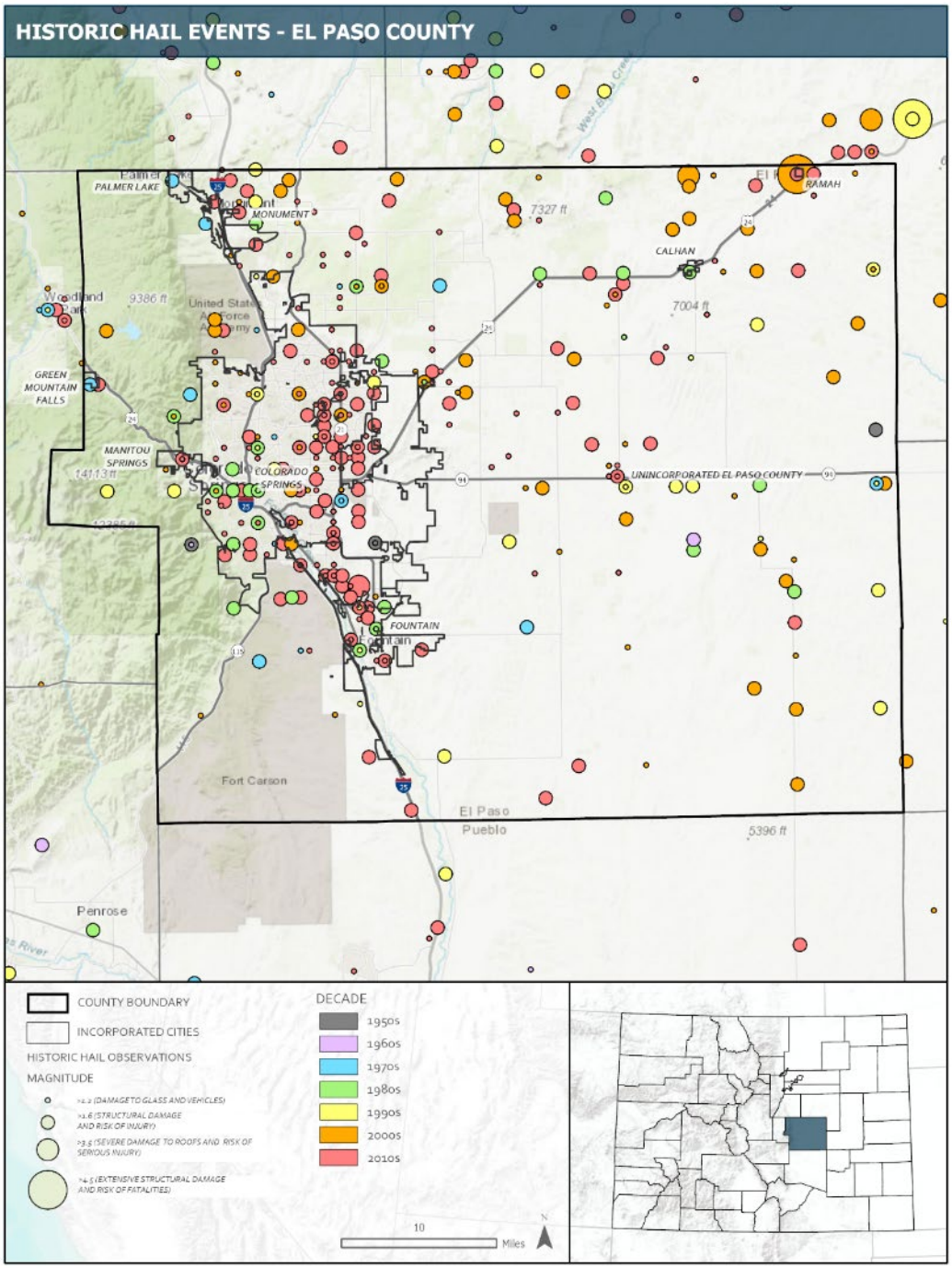
Table 4-21: El Paso County Hail Event with Hail Diameter Greater than 2 inches, 2001 - 2019

Location	Date	Magnitude	Description
Truckton	6/4/2001	2.25	
Calhan	6/20/2001	4	A very severe thunderstorm dumped giant hail from the Elbert-El Paso county line into Calhan. The hail swath was around 2 miles wide.
Calhan	5/10/2004	2.75	A hailstorm began around Calhan and bombarded the area with hail up to the size of baseballs which damaged many buildings and vehicles.
Ramah	8/9/2004	4.5	
Rush	8/9/2004	2.75	
Falcon	8/10/2004	3	
Falcon	8/10/2004	2.75	

Location	Date	Magnitude	Description
U.S. Air Force Academy	8/21/2004	3	
U.S. Air Force Academy	8/23/2007	2	Severe thunderstorms generated hail up to 2 inches in diameter and wind gusts up to around 80 mph which caused significant damage over portions of the City of Pueblo as well as the north side of Colorado Springs. Well over 5,000 houses and 11,000 vehicles sustained damage in El Paso and Pueblo Counties. Damage estimates approached 100 million dollars.
Ramah	8/17/2009	2.5	Several severe thunderstorms generated hail up to the size of tennis balls
Black Forest	7/4/2010	2	Several severe thunderstorms over eastern Colorado, especially over sections of El Paso and Teller Counties, produced large hail up to around golf ball size and wind gusts around 60 mph.
Peterson AFB	6/7/2012	2.5	Supercell storms produced very large hail and two tornadoes in El Paso County.
Ft Carson	6/4/2015	2	A severe storm produced severe hail, damaging winds, and three tornados in northeast El Paso County, and other severe storms brought hail up to the size of tennis balls in western El Paso County. Large hail damaged many vehicles at Fort Carson.
Peyton	8/17/2015	2.5	Severe storms produced hail up to the size of tennis balls in and around Peyton, as well as wind gusts in excess of 60 mph.
Fountain	6/7/2016	2	A few severe storms produced hail up to 2 inches in diameter across western and southern Colorado Springs, Security, and Pueblo County.
Monument	7/8/2016	2.5	Severe storms occurred in the I-25 corridor, and produced hail up to the size of tennis balls and some flash flooding in Security.
Peterson AFB	7/14/2016	2	Several severe storms produced hail up to 2 inches in diameter.
Co Springs Airport	7/28/2016	2.5	A few severe storms produced very large hail and flash flooding in the Colorado Springs metro area. Several water rescues occurred, and hail up to the size of tennis balls caused widespread damage. The total dollar loss from hail alone was around $353 million.
Falcon	7/28/2016	2.5	See above description.
Monument	5/26/2017	2	Severe storms produced hail up to 2 inches in diameter across extreme northern El Paso County.
Fountain	5/28/2018	2	Severe thunderstorms moving across portions of Teller and El Paso counties, generated hail up to the size of Hen eggs and gusty winds during the afternoon of the 28th, with the Hen egg size hail reported approximately 7 miles to the south of Fountain in El Paso county.
Widefield	6/12/2018	2	A rare nocturnal hail event impacted El Paso County during the early morning hours (MDT) of Wednesday, June 13th, 2018, producing hail up to 3 inches in diameter. Media reports indicate that this event caused $169 million in damages to vehicles, trees, roofs, siding, windows, skylights and other parts of homes. Some of the larger reported hailstones with this event during the early morning of the 13th included hail the size of hen eggs at Widefield, hail the size of tennis balls at Security and hail the size of teacups in Fountain and Peterson Air Force Base.
Peterson AFB	6/12/2018	3	See above description.
Fountain	6/13/2018	3	See above description.
Monument	6/19/2018	2	Severe thunderstorms produced hail up to the size of teacups in El Paso county, while a severe storm produced hail up to the size of quarters in Baca county. Some of the larger reported hailstones with this event included hail up to the size of quarters near Peyton and Springfield, hail the size of hen eggs near Monument and Ramah and

Location	Date	Magnitude	Description
			an impressive report of teacup size hail near Black Forest in northern El Paso county.
Black Forest	6/19/2018	3	See above description.
Ramah	6/19/2018	2	See above description.
Co Springs	6/24/2018	2	Another round of severe thunderstorms pummeled portions of El Paso county with hail up to the size of hen eggs observed near Colorado Springs, while golf ball hail was observed near Woodland Park in Teller county.
Ramah	7/29/2018	2	Severe thunderstorms impacted southeastern Colorado during the afternoon and evening of the 29th, producing hail up to the size of large apples as well damaging thunderstorm winds which caused tree damage, windows and windshields to be broken as well as damaging and/or destroying sheds. Some of the larger hailstone reports with this event included hail the size of quarters near Brandon, Calhan and Crestone, hail the size of Half Dollars near Fountain as well as hail the size of Ping-Pong Balls near Bristol and Sheridan Lake. Golf Ball hail was reported near Holly, while hail the size of Limes were measured near Fowler, Granada and Ramah.
Ft Carson	8/6/2018	2.75	Another severe hail event (with hail up to the size of softballs or 4 inches in diameter) battered El Paso county and sections of northern Pueblo county during the afternoon hours of Monday, August 6th, 2018. Media reports indicate that this event caused $172 million in damages to vehicles, trees, roofs, siding, windows, skylights and other parts of homes, etc. Especially hard hit locations included but were not limited to portions of Colorado Springs, the Broadmoor area, the Cheyenne Mountain Zoo and the communities of Fountain and Widefield. In addition, 8 persons were injured when this hailstorm impacted the Cheyenne Mountain Zoo. Sadly, 4 zoo animals perished in this storm. Some of the larger reported hailstones with this event during the afternoon of the 6th included hail the size of ping pong balls near Security and Falcon, hail the size of golf balls near Avondale, hail near the size of tennis balls near the Pueblo Depot, hail the size of baseballs near Fort Carson, hail the size of tea cups near Fountain and hail the size of softballs near Widefield.
Co Springs	8/6/2018	2.75	See above description.
Widefield	8/6/2018	4	See above description.
Fountain	8/6/2018	3	See above description.
Black Forest	7/5/2019	2	A series of late evening strong to severe thunderstorms quickly developed over the high terrain of the Rampart Range and moved eastward towards Colorado Springs, Black Forest, Fountain, Hanover and eventually Boone, CO. Large hail was reported in several places. Some hailstones reached 2.5 inches in diameter near Black Forest, CO. The storms continued to move east into the eastern plains of Colorado where they weakened but produced a prolific lightning show. Regional lightning detection equipment reported over 2,000 cloud to ground lightning strikes within 2 hours across the eastern Colorado plains.
Black Forest	7/5/2019	2.5	See above description.

Figure 4-19: Historic Hail Events by Size, 1955 - 2018



4.7.1.3 Vulnerability

Table 4-22: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Environmental Damage	Overall Risk Score
Calhan	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Colorado Springs	Highly Likely	Limited	Significant	Moderate	Negligible	Moderate
El Paso County	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Fountain	Highly Likely	Limited	Significant	Moderate	Negligible	Moderate
Green Mtn Falls	Highly Likely	Limited	Significant	Moderate	Negligible	Moderate
Manitou Springs	Highly Likely	Limited	Significant	Moderate	Negligible	Moderate
Monument	Highly Likely	Limited	Significant	Moderate	Negligible	Moderate
Palmer Lake	Highly Likely	Limited	Significant	Moderate	Negligible	Moderate
Ramah	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Regionwide	Highly Likely	Limited	Significant	Moderate	Negligible	Moderate

Spatial Extent and Geographic Location

Severe weather events have the potential to happen anywhere in the planning area. The entire extent of Pikes Peak Region is exposed to the hailstorm hazard.

Probability of Future Occurrence

Highly Likely: Near 100% annual probability of occurrence (all jurisdictions). According to historical data available, it is likely that a major hail event will occur every year. Based on a record of 70 significant hailstorm events (2+ inch diameter) over an 18-year period, significant hail occurs more than 4 times per year on average and is considered highly likely. Intense summer storms may become more frequent in the future, increasing the frequency of hail events.

Figure 4-20: Hail that Fell at Fort Carson in August 2018

Source: National Weather Service

Magnitude / Severity

Limited: Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours. It is possible that a hail event in the County could be **critical**: isolated deaths or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and interruption of essential facilities and services for 24 to 72 hours.

Warning Time

Moderate: Warning time is 6 to 12 hours. Meteorologists can often predict the likelihood of a severe storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time.

Exposure and Losses

➢ Property

El Paso County is vulnerable to significant hailstorms in the future. Although weather forecasting provides warning for upcoming events, knowing exactly where and how large of an impact to people and property is nearly impossible to predict. Hail-producing thunderstorms are a regular occurrence in the Region, and it is reasonable to expect future damage to automobiles, structures, and potentially individuals.

Table 4-23: Loss Estimates for the General Building Stock for Jurisdictions that have Exposure to Hail

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Estimated Loss Potential			
			10% Damage	30% Damage	50% Damage	100% Damage
Calhan	511	100%	$5,845,421	$17,536,263	$29,227,106	$58,454,211
Colorado Springs	137,504	100%	$4,831,347,170	$14,494,041,511	$24,156,735,851	$48,313,471,703
El Paso County	74,432	100%	$1,830,048,987	$5,490,146,961	$9,150,244,935	$18,300,489,870
Fountain	8,677	100%	$203,673,779	$611,021,338	$1,018,368,896	$2,036,737,793
Green Mtn Falls	377	100%	$8,072,542	$24,217,626	$40,362,711	$80,725,421
Manitou Springs	2,134	100%	$65,589,223	$196,767,670	$327,946,116	$655,892,232
Monument	2,373	100%	$93,071,660	$279,214,981	$465,358,302	$930,716,603
Palmer Lake	1,257	100%	$32,015,850	$96,047,550	$160,079,250	$320,158,500
Ramah	91	100%	$525,105	$1,575,314	$2,625,524	$5,251,048
Regionwide	**227,356**	**100%**	**$7,070,189,738**	**$21210569214**	**$35,350,948,690**	**$70,701,897,380**

➢ Population

It can be assumed that the entire planning area is exposed to some extent to hail events, although death or injury as a direct result of a hailstorm is unlikely. Vulnerable populations are the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure during hail events and could suffer more secondary effects of the hazard.

➢ Environment

The environment is highly exposed to thunderstorms, high winds, and hail. Natural habitats such as streams and trees risk major damage and destruction. Prolonged rains can saturate soils and lead to slope

failure. Flooding events can produce river channel migration or damage riparian habitat. Hailstorms can also cause crop damage ranging from moderate to a total loss. The impact of hail on a plant tissue depends on the size of the hailstones, duration of the storm, and the growth stage of the plants.

➢ Critical Facilities and Infrastructure

All critical facilities are exposed to risks associated with hail. Significant damage to critical facility and infrastructure that would result in a loss of function is uncommon. However, hail events may occur simultaneously with other natural hazards, such as thunderstorms, that may result in damage or loss of function to facilities and infrastructure.

Incapacity and loss of roads are the primary transportation failures resulting from thunderstorms, wind and hail, mostly associated with secondary hazards. Landslides caused by heavy prolonged rains can block roads. High winds can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating population, and disrupting ingress and egress. Of particular concern are roads providing access to isolated areas and to the elderly. Prolonged obstruction of major routes due to landslides, debris or floodwaters can disrupt the shipment of goods and other commerce. Large, prolonged storms can have negative economic impacts for an entire region. Severe windstorms and downed trees can create serious impacts on power and above-ground communication lines. Loss of electricity and phone connection can leave certain populations isolated because residents are unable to call for assistance.

4.7.1.4 Consequence Analysis

Hail Consequence Analysis	
Category	**Narrative**
Hazard Description	Large hailstones are capable of damaging structures, automobiles, and crops, and harming individuals and livestock.
Impact to Property, Facilities, and Infrastructure	Hail affects the entire planning area, including all above-ground structures and utilities. Although all buildings and equipment are exposed to hailstorms, impact to such should not typically amount to disruption or debilitating damage. Generally, many instances of small amounts of damage reflect high event-wide property losses, including structures and vehicles. Large hailstorms can result in localized flooding when the hailstones form dams in storm water drainage ways. These secondary effects of hail are difficult to predict or prevent but can cause significant damage to structures. Hail-producing thunderstorms are a regular occurrence in the Pikes Peak Region, and it is reasonable to expect future damage to automobiles, structures, and potentially individuals.
Impact on the Environment	Tornadoes, high winds and hail, impact the environment by potentially spreading debris and pollution; damaging sewer and wastewater treatment plants, disturbing the wildlife and natural areas, and damaging crops.
Impact on Responders	Fire and police, and emergency responders are called on to the impacted area to close roads, attend to the injured, and direct traffic away from the disaster area. The

	Red Cross would be asked to provide shelters and attend to the injured. The Humane Society of the Pikes Peak Region would be asked to provide shelters for all animals. Members of the Voluntary Organizations Active in Disasters would be requested to assist with recovery. Exposure exists to personnel performing routine duties when event occurs; storm-related duties are primarily post-event; however, unsafe structural or environmental conditions may persist during the response period. Extreme hail events can cause damage to responder transportation vehicles and a delay in response services.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	None or limited loss of facilities or infrastructure function or accessibility or ability to provide services. Interruption of essential facilities and services for less than 24 hours.
Impact on the Public	Minor injuries and illnesses. Motorists, outdoor workers, outdoor recreationists are at risk from direct impact or deteriorated road conditions due to precipitation on the road surface.
Impact on the Economic Condition of the County	Hail is an insurable expense on most insurance policies. While initial impacts could be felt through stores being closed due to damage (such as grocery stores), repairs and recovery would occur rapidly enough to restore essential services. Insurance claims from large hailstorms tend to be small in amount (i.e., property by property damages) but high in the total number of claims which results in high aggregate losses. Crop damage and loss to farmers may be significant. There were over 500 records of significant hailstorms in El Paso County from 2001 to 2019. One particular storm caused close to $100 million in damage in Colorado Springs and Pueblo Counties when large hail damaged over 5,000 homes and 11,000 automobiles.
Impact on the Public Confidence in Government	Confidence is highly dependent on the public's perception on how well response and recovery are handled during and after an event. A response that either shows or gives the impression the County is prepared and responsive to the public's needs and that it manages a recovery to get its services back to full operational capabilities and damage repaired in a timely manner will maintain or enhance the County's reputation. Notification/communication with people, especially of vulnerable populations, is essential.

4.7.1.5 Secondary Hazards

The most significant secondary hazards associated with hailstorms are floods resulting from storm drains that have been clogged with hail.

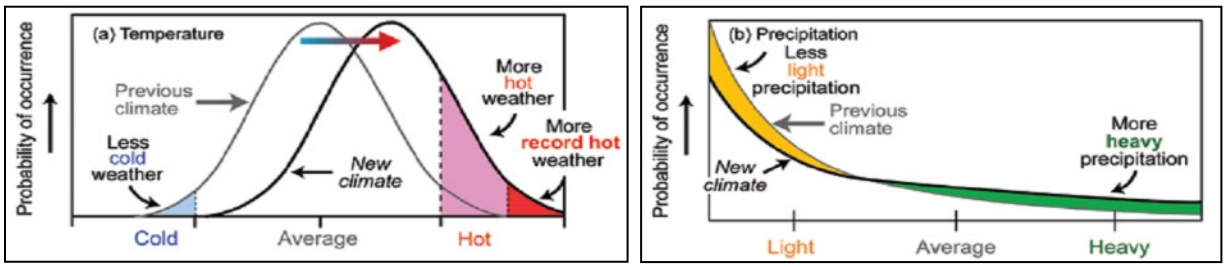
4.7.1.6 Future Condition Impacts

All future development will be affected by hail. The ability to withstand impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction. The area planning departments are governed by the International Building Code. This code is equipped to deal with the

impacts of severe weather events, including hail. Land use policies identified in general plans within the planning area also address many of the secondary impacts (flood) of the hail hazard.

Climate change presents a significant challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. Historical data shows that the probability for severe weather events increases in a warmer climate (see Figure 4-21). The changing hydrograph caused by climate change could have a significant impact on the intensity, duration and frequency of storm events. All of these impacts could have significant economic consequences.

Figure 4-21: SEVERE WEATHER PROBABILITIES IN WARMER CLIMATES



4.7.1.7 Issues

Important issues associated with a hail event in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to damage from large diameter hail events.
- Hail may clog storm water infrastructure and exacerbate flooding within the area.
- Hail may result in crop damage and loss.
- Many instances of small amounts of damage reflect high event-wide property losses, including structures and vehicles

4.7.2 DROUGHT & EXTREME HEAT

4.7.2.1 Definition and Extent

Drought is a shortage of water associated with a deficiency of precipitation due to prolonged climate patterns, and occurs when a normal amount of moisture is unavailable to satisfy an area's usual water consumption. Drought can be defined regionally based on its effects in the following categories:

- **Meteorological** drought is usually defined by a period of below average water supply.
- **Agricultural** drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.

DEFINITIONS

Drought: A shortage of water associated with a deficiency of precipitation due to prolonged climate patterns, and occurs when a normal amount of moisture is unavailable to satisfy an area's usual water consumption.

Extreme Heat: Summertime weather that is substantially hotter and/or more humid than average for a location at that time of year.

- **Hydrological** drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- **Socioeconomic** drought occurs when a drought impacts health, well-being, and quality of life or when a drought starts to have an adverse economic impact on a region.

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

The National Oceanic and Atmospheric Administration (NOAA) has developed several indices to measure drought impacts and severity and to map their extent and locations:

- The ***Palmer Crop Moisture Index*** measures short-term drought on a weekly scale and is used to quantify drought's impacts on agriculture during the growing season.
- The ***Palmer Z Index*** measures short-term drought on a monthly scale.
- The ***Palmer Hydrological Drought Index (PDSI)*** measures the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during a given month is dependent on the current weather patterns plus the cumulative patterns of previous months. Weather patterns can change quickly from a long-term drought pattern to a long-term wet pattern, and the PDI can respond fairly rapidly.
- While the Palmer indices consider precipitation, evapotranspiration, and runoff, the ***Standardized Precipitation Index (SPI)*** considers only precipitation. In the SPI, an index of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The SPI is computed for time scales ranging from one month to 24 months.

The PDSI was developed by Wayne Palmer in the 1960s and uses temperature and rainfall information in a formula to determine dryness. Over time it has become the semiofficial drought index for risk assessment and hazard analysis. The Palmer Index is most effective in determining long term drought—a matter of several months—and is not used for short-term forecasts (a matter of weeks). It uses a 0 as normal conditions, and drought is shown in terms of negative numbers; for example, -2 is moderate drought, -3 is severe drought, and -4 is extreme drought. Table 4-24, below, provides an overview of the Palmer Index compared to other drought classification systems. The return period is related to how often the type of drought typically occurs. For example, a minor drought occurs every 3-4 years.

Table 4-24. Palmer Drought Severity Index

Drought Severity	Return Period (Years)	Description of Possible Impacts	Drought Monitoring Indices		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Minor	3 to 4	**Going into drought:** • Short-term dryness. • Slowing growth of crops or pastures. • Fire risk above average. **Coming out of drought:**	-0.5 to -0.7	D0	-1.0 to -1.9

Drought Severity	Return Period (Years)	Description of Possible Impacts	Drought Monitoring Indices		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
		• Some lingering water deficits. • Pastures or crops not fully recovered.			
Moderate	5 to 9	Some damage to crops or pastures, fire risk high, streams, reservoirs, or wells low, some water shortages (developing or imminent), voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe	10 to 17	Crop or pasture losses likely, fire risk very high, water shortages common, water restrictions imposed.	-1.3 to -1.5	D2	-3.0 to -3.9
Extreme	18 to 43	Major crop and pasture losses, extreme fire danger, widespread water shortages or restrictions.	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional	43+	Exceptional and widespread crop and pasture losses, exceptional fire risk, shortages of water in reservoirs, streams, and wells creating water emergencies.	Less than -2	D4	-5.0 or less

**Source: National Drought Mitigation Center*

Defining when drought begins is a function of the impacts of drought on water users and includes consideration of the supplies available to local water users as well as the stored water they may have available in surface reservoirs or groundwater basins. Different local water agencies have different criteria for defining drought conditions in their jurisdictions. Some agencies issue drought watch or drought warning announcements to their customers. Determinations of regional or statewide drought conditions are usually based on a combination of hydrologic and water supply factors.

Extreme heat events are defined by the U.S. EPA as "summertime weather that is substantially hotter and/or more humid than average for a location at that time of year" (EPA, 2006). It is often also defined as a period of three or more consecutive days above 90 degrees Fahrenheit, but more generally a prolonged period of excessively hot weather, which may be accompanied by high humidity. Criteria that define an excessive heat event may differ among jurisdictions and in the same jurisdiction depending on the time of year.

Excessive heat events are often a result of more than just ambient air temperature. Heat index tables (see Table 4-25) are commonly used to provide information about how hot it feels to the human body when relative humidity is factored into the actual air temperature. When relative humidity is high, the increased moisture content in the air decreases the evaporation of perspiration, thus making the body feel warmer. Since heat index values were devised for shady, light wind conditions, exposure to full sunshine can increase heat index values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

Table 4-25: Heat index chart

Relative Humidity (%)	Temperature (°F)															
	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Category	Heat Index	Health Hazards
Extreme Danger	130 °F – Higher	Heat Stroke or Sunstroke is likely with continued exposure.
Danger	105 °F – 129 °F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Extreme Caution	90 °F – 105 °F	Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.
Caution	80 °F – 90 °F	Fatigue possible with prolonged exposure and/or physical activity.

Source: https://www.weather.gov/ama/heatindex

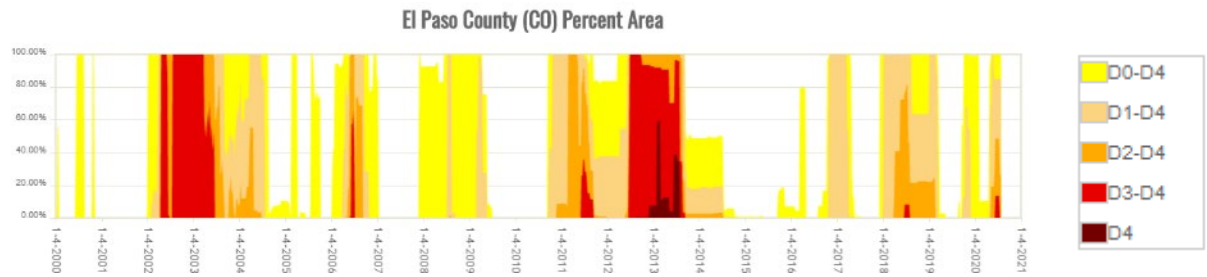
4.7.2.2 Previous Occurrences

Drought

According to the 2018 Colorado Drought Mitigation and Response Plan, between 2005 and June 2018, there were sixteen drought reported impacts in El Paso County in USDA Secretarial Disaster Declarations: S2188, S2329, S2750, S3125, S3133, S3172, S3229, S3260, S3456, S3627, S3785, S4145, S4313, S4326, S4331, and S4332. In order to receive these designations, damages and losses must have resulted in the production loss of at least 30 percent of one crop in the County as the result of a natural disaster (State of Colorado Drought Mitigation and Response Plan, 2018)

As seen in Figure 4-22, since 2000, El Paso County saw complete coverage by a D3-D4 level drought in 2002-2003 and again in 2012-2013.

Figure 4-22: El Paso County Drought History

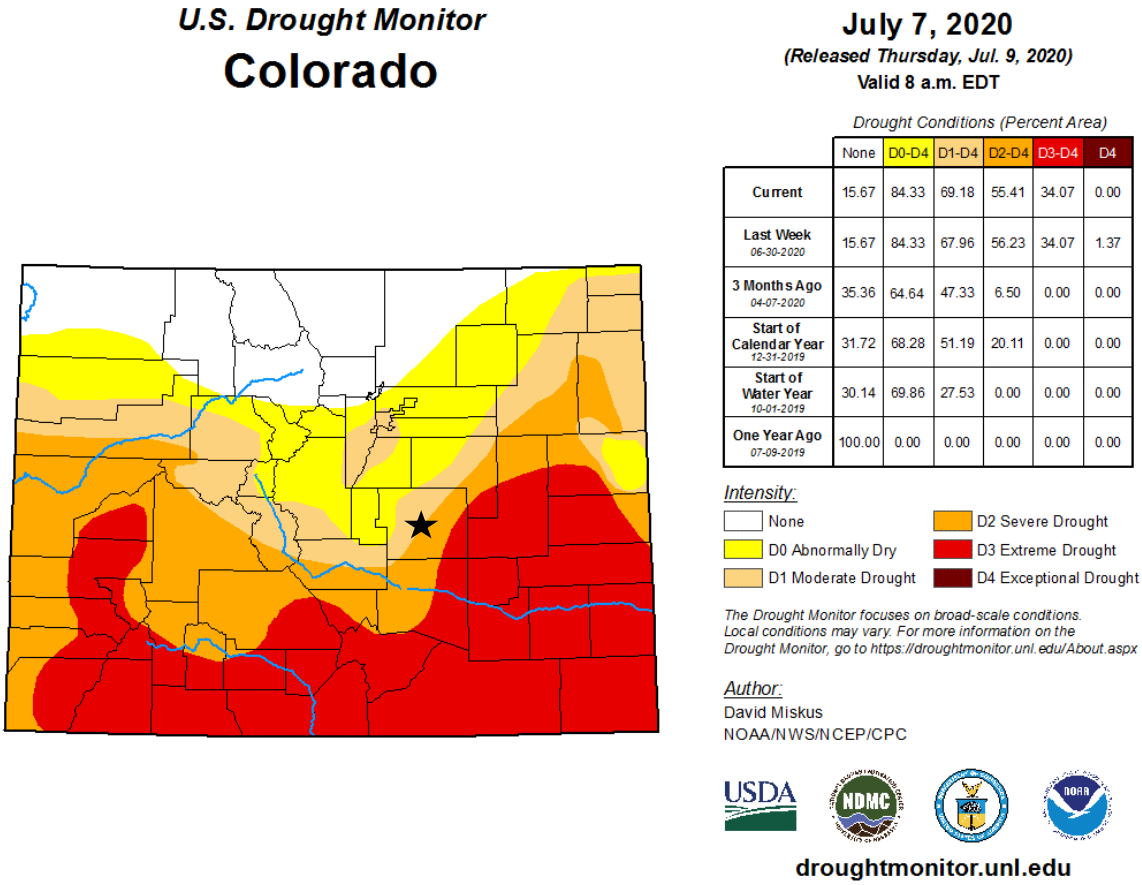


Source: US Drought Monitor https://droughtmonitor.unl.edu/Data/Timeseries.aspx

As of August 5, 2020, the USDA had declared El Paso as a Designated Drought Disaster County. According to a Drought Information Statement released by the National Weather Service stating: "warm and mainly dry conditions, especially across southern portions of Colorado, throughout meteorological Spring of 2020 (March, April and May) has led to deteriorating drought conditions across all of south central and southeast Colorado over the past few months. In the latest Colorado Water Supply Outlook Report, NRCS data indicated that for the second month in a row, all of the major river basins in Colorado experienced below average precipitation, with the statewide average for May coming in at only 50 percent of normal" (NWS, 2020).

According to the U.S Drought Monitor, as of July 7, 2020, 84% of Colorado residents are living in drought conditions right now (Figure 4-23).

Figure 4-23: U.S. Drought Monitor for Week Ending July 7, 2020



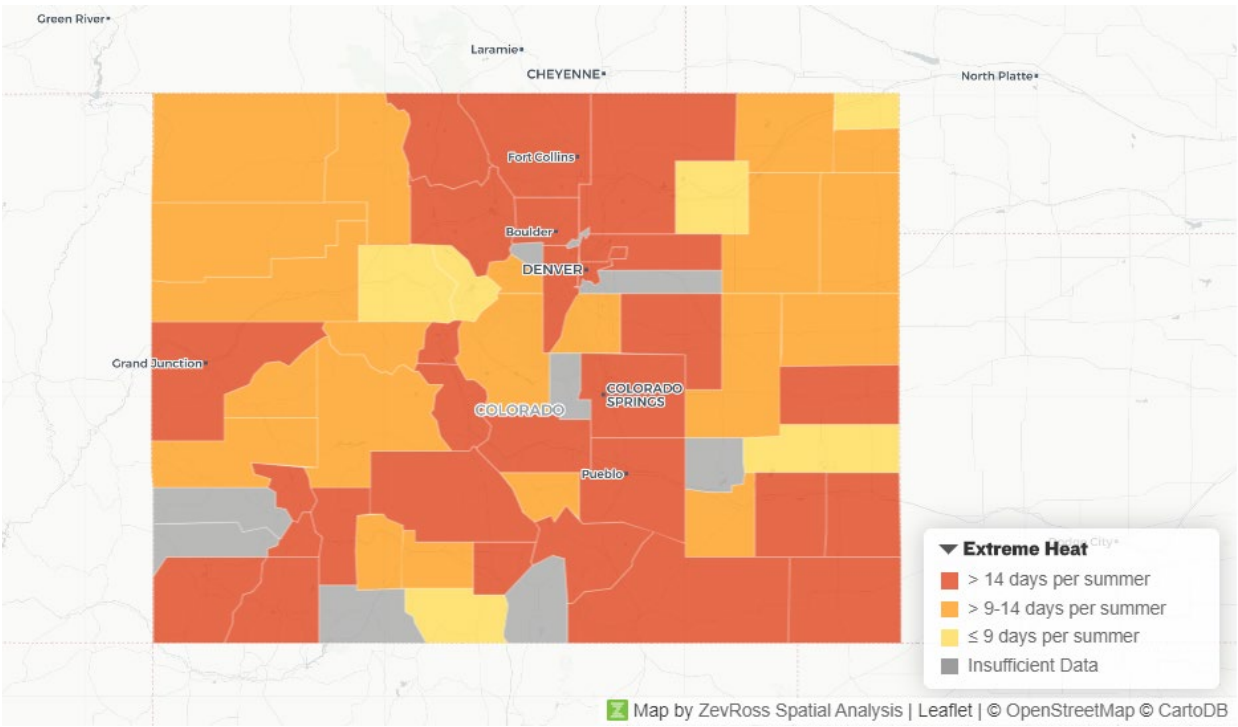
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	15.67	84.33	69.18	55.41	34.07	0.00
Last Week 06-30-2020	15.67	84.33	67.96	56.23	34.07	1.37
3 Months Ago 04-07-2020	35.36	64.64	47.33	6.50	0.00	0.00
Start of Calendar Year 12-31-2019	31.72	68.28	51.19	20.11	0.00	0.00
Start of Water Year 10-01-2019	30.14	69.86	27.53	0.00	0.00	0.00
One Year Ago 07-09-2019	100.00	0.00	0.00	0.00	0.00	0.00

Extreme Heat

There is no known database that records incidences of extreme heat events, however, extreme heat events typically occur when temperatures are approximately 10 degrees above normal for the time of year for that location or when high temperatures are sustained for long periods of time.

Figure 4-24, developed by the National Resource Defense Council (NRDC), shows the average number of extreme heat days per county from 2007 to 2016. In this analysis, extreme heat days are defined as days with daily maximum temperatures above the 90th percentile June-July-August temperature relative to a 1961-1990 reference period. According to this analysis, El Paso County experienced, on average, more than 14 days per year of extreme heat days than would be expected from the reference period. Based on historical records, areas with more than 9 days of extreme heat are living with more days of extreme heat than they did in the past.

Figure 4-24: Extreme Heat Vulnerability in Colorado by County, 2007–2016



Source: NRDC. https://www.nrdc.org/climate-change-and-health-extreme-heat#/map/detail/CO

The Western Regional Climate Center contains records of climate norms for stations across the United States. Table 4-26 and Table 4-27 contains temperature summaries related to extreme heat for the Colorado Springs Municipal Airport (KCOS) station.

Table 4-26: Temperature Data from Colorado Springs Municipal Airport (1981-2010)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temperature (degrees Fahrenheit)												
Average Maximum Temperature	43.2	44.8	52.1	59.8	69.1	79.0	84.8	81.6	74.5	63.0	51.0	42.1

Source: Western Regional Climate Center. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?co1778

Table 4-27: Number of Days Annually Above 95 Degrees Fahrenheit

Extreme Temperatures												
	2003	2005	2006	2008	2010	2011	2012	2013	2014	2016	2018	2019
Maximum temperature above 95	9	5	1	4	2	2	10	3	1	5	5	7

Source: The Climate Explorer https://crt-climate-explorer.nemac.org/

Note: This chart excludes any years that are missing more than five daily temperature reports.

4.7.2.3 Vulnerability

Table 4-28: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Environmental Damage	Overall Risk Score
Calhan	Likely	Limited	Significant	Maximum	Minor	Moderate
Colorado Springs	Likely	Limited	Significant	Maximum	Minor	Moderate
El Paso County	Likely	Limited	Significant	Maximum	Minor	Moderate
Fountain	Likely	Limited	Significant	Maximum	Minor	Moderate
Green Mtn Falls	Likely	Limited	Significant	Maximum	Minor	Moderate
Manitou Springs	Likely	Limited	Significant	Maximum	Minor	Moderate
Monument	Likely	Limited	Significant	Maximum	Minor	Moderate
Palmer Lake	Likely	Limited	Significant	Maximum	Minor	Moderate
Ramah	Likely	Limited	Significant	Maximum	Minor	Moderate
Regionwide	Likely	Limited	Significant	Maximum	Minor	Moderate

Spatial Extent and Geographic Location

Drought

El Paso County is a semi-arid region with annual average precipitation levels of 15.74 inches and an annual average of 39 inches of snow. Due to Colorado's semiarid conditions, drought is a natural but unpredictable occurrence in the state. However, because of natural variations in climate and precipitation sources, it is rare for all of Colorado to be deficient in moisture at the same time. Single season droughts over some portion of the state are quite common.

The entire County is at risk to drought conditions**.** Drought is one of the few hazards that has the potential to directly or indirectly impact every person in the County as well as adversely affect the local economy.

County residents receive water from a limited number of sources: primarily surface water (much of which is brought from outside of the region) and water districts that draw water from groundwater aquifers, but also including individual homeowner wells into ground aquifers.

The 2018 El Paso County Water Master Plan looked extensively at water availability, sources and future demands. The expected water demands of the 2060 build out scenario are nearly double that of present day.

Extreme Heat

The entire County is at risk to extreme heat events; however, these events may be exacerbated in urban areas, where reduced air flow, reduced vegetation, increased impermeable surfaces, and increased generation of waste heat can contribute to temperatures that are several degrees higher than in surrounding rural or less urbanized areas. This phenomenon is known as urban heat island effect.

Probability of Future Occurrence

The probability of a future drought or extreme heat event in El Paso County is **likely**, with between 25- and 75-percent chance of occurrence in any given year. Seventy six percent of El Paso County falls within the Koeppen Climate Zone of cold semi-arid. NOAA projects that by 2100, temperatures in this climate zone are expected to increase to between 6 and 14 degrees above historic levels. There may be as many as 120 extreme heat days annually in parts of the climate zone by 2100. The cold semi-arid climate zone is the driest area of the state. Precipitation levels are generally expected to remain unchanged, although a few areas may see minor increases or decreases by 2100.

Magnitude / Severity

Drought

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

Drought can have a widespread impact on the environment and the economy, depending upon its severity, although it typically does not result in loss of life or damage to property, as do other natural disasters. The National Drought Mitigation Center uses three categories to describe likely drought impacts:

- Agricultural—Drought threatens crops that rely on natural precipitation.
- Water supply—Drought threatens supplies of water for irrigated crops and for communities, businesses, and homeowners.
- Fire hazard—Drought increases the threat of wildfires from desiccated forests and rangelands.

The most significant impacts associated with drought in Colorado are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. An ongoing drought may leave an area more prone to beetle kill and associated wildfires. Drought conditions can also cause soil to compact, increasing an area's susceptibility to flooding, and reduce vegetation cover, which exposes soil to wind and erosion. A reduction of electric power

generation and water quality deterioration are also potential problems. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in streams and groundwater decline.

Drought also is often accompanied by extreme heat. When temperatures reach 90ºF and above, people are vulnerable to sunstroke, heat cramps, and heat exhaustion. Pets and livestock are also vulnerable to heat-related injuries. Crops can be vulnerable as well.

Extreme Heat

Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. From 2004-2018, excessive heat exposure caused in excess of 10,500 deaths in the United States, approximately 90% of these deaths occurring during May to September (CDC, 2020). Every year, on average, there are 702 deaths from extreme heat events (CDC, 2020). Those susceptible to extreme heat may suffer from dehydration, heat exhaustion, heat cramps, heat stokes or even death. Air-conditioning is the number one protective factor against heat-related illness and death. Overall impact to population is considered **Critical**: isolated deaths and/or multiple injuries and illness. However, impact to property and critical facilities is considered **Minor**: little or no property damage and no or brief interruption of essential facilities and services.

Warning Time

Maximum: more than 24 hours. Droughts are climatic patterns that occur over long periods of time. Only generalized warnings can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions. Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature.

Scientists currently do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale.

Based on the criteria for heat stress forecasts developed by the National Weather Service (NWS), watches or warnings are issued when thresholds of daytime high and nighttime low heat index values are exceeded for at least two consecutive days. The heat index is based on temperature and relative humidity, as shown in Table 4-25: Heat index chart.

Exposure and Losses

All people, property and environments in the planning area would be exposed to some degree to the impacts of moderate to extreme drought and extreme heat conditions.

Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to the

ability to produce goods and provide services. Drought can affect a wide range of economic, environmental, and social activities. The vulnerability of an activity to the effects of drought usually depends on its water demand, how the demand is met, and what water supplies are available to meet the demand. Extreme heat events can exacerbate the effects of severe drought conditions.

The Colorado Natural Hazard Mitigation Plan notes that unincorporated El Paso County has $31,747,752,419 in crop insurance-based loss estimates (3-72). While this number is significant, the 2018 state drought plan also notes that El Paso County has a relatively low socio-economic vulnerability impact to drought.

➢ Property

No structures will be directly affected by drought conditions, though some structures may become vulnerable to wildfires, which are more likely following years of drought. Droughts can also have significant impacts on landscapes, which could cause a financial burden to property owners. However, these impacts are not considered critical in planning for impacts from the drought hazard.

➢ Population

No significant life or health impacts are anticipated as a result of drought within the planning area. Extreme heat events cause more deaths per year than hurricanes, lightning, tornadoes, earthquakes and flood combined. Particular populations have been identified by the CDC to be more vulnerable to extreme events. County residents that lack air conditioning, senior citizens, young children, and people with mental illness and chronic diseases are most likely to be impacted by severe heat events (CDC, 2017). “People who work or exercise outdoors are also among the populations most vulnerable to heat-related health effects. City residents also face a heightened risk because of warmer temperatures in cities from the urban heat island effect, caused by the mostly paved surfaces that absorb and re-radiate heat and the lack of green spaces and tree cover in these areas” (Natural Resource Defense Council, https://www.nrdc.org/climate-change-and-health-extreme-heat#/map/detail/CO, n.d.)”

➢ Environment

Environmental losses from drought are associated with damage to plants, animals, wildlife habitat, and air and water quality; forest and range fires; degradation of landscape quality; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes and vegetation. However, many species will eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity. Although environmental losses are difficult to quantify, growing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects.

➢ Critical Facilities and Infrastructure

Critical facilities as defined for this plan will continue to be operational during a drought. Drought normally does not impact structures. Although water and sewer infrastructure may be affected by drought, other

critical facilities are generally not. Major strains on electricity grid, power lines sag, and possible brown-outs or black-outs may occur as a result of extreme heat.

4.7.2.4 Consequence Analysis

Drought and Extreme Heat Consequence Analysis	
Category	**Narrative**
Hazard Description	Drought is a shortage of water associated with a deficiency of precipitation due to prolonged climate patterns, and occurs when a normal amount of moisture is unavailable to satisfy an area's usual water consumption. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends. Extreme heat is summertime weather that is substantially hotter and/or more humid than average for a location at that time of year. Drought also is often accompanied by extreme heat. When temperatures reach 90ºF and above, people are vulnerable to sunstroke, heat cramps, and heat exhaustion. Pets and livestock are also vulnerable to heat-related injuries. Crops can be vulnerable as well.
Impact to Property, Facilities, and Infrastructure	Although no or minimal property damage is typically associated with drought or extreme heat, the loss of farmland and diminishing domestic water supply can be devastating to local economies. Major strains on electricity grid, power lines sag, and possible brown-outs or black-outs may occur as a result of extreme heat. Increased risk of wildfire can threaten catastrophic loss of buildings. Critical infrastructure (e.g., dams, transmountain ditches, irrigation ditches) can be damaged by excessively dry expansive soil as it contracts. Dams and ditches can experience structural damage due to decreased pore water pressure, damage caused by high sediment loads when pulling water from the bottom of reservoirs, and damage caused by debris flows and flooding following wildfires.
Impact on the Environment	Extended periods of drought and extreme heat can stress both flora and fauna species and may alter or disrupt local habitat, resulting in an increased interface with people, and reduction in numbers of animals. Land quality can be negatively impacted by overgrazing during drought and water quality can become degraded to the point of causing localized fish kills. Low stream flows will have negative impacts on riparian habitats and aquatic species. An occurrence of drought can also trigger one or more secondary events, particularly wildfire and potentially subsidence. Severe wildfires are especially a concern during times of severe to exceptional drought. The loss of farmland and diminishing domestic water supply can be devastating to local economies and natural ecosystems.
Impact on Responders	There should be no or minimal threat to responders as drought is not considered an 'incident' response type of hazard. Firefighters, peace officers, EMTs, and paramedics are at increased risk when heat is extreme. It is important for first

	responders and their departments to be well-versed in both the symptoms and best measures for prevention.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Interruption of essential facilities and services for less than 24 hours. The slow onset and nature of drought makes it unlikely to have an impact on continuity of operations. Nature of hazard not expected to impact delivery of government services, except for moderate impact on water utilities. In extreme cases, municipal water delivery may be interrupted. Ability to deliver recreational services may be impacted at the local level. Food supply and delivery could be disrupted, with an associated increase in food prices. For extreme heat, loss of facilities or infrastructure function or accessibility or ability to provide services. Power interruption is likely if not adequately equipped with backup generation.
Impact on the Public	The greatest risk to people from drought is the drinking water supply through water systems or individual wells. CSU completed their Water Conservation Plan for 2008-2012. That plan indicates there is an adequate water supply to meet the projected needs until 2046, according to future demand expectations for the CSU water service area. Reduced air quality associated with blowing dust could have detrimental impacts. As growth continues, so does the vulnerability for residents and business owners to drought impacts. Careful monitoring of the region's water supply will help drive conservation efforts and potential land use regulations aimed at minimizing drought impacts among other growth-related impacts. Communication to the public of water preservation (i.e. lawn and vegetation watering) and wildfire prone areas would be essential. Extreme heat affects human health by contributing to general discomfort, respiratory difficulties, heat cramps and exhaustion, non-fatal heat stroke, and heat-related mortality. Residents that lack air conditioning, senior citizens, young children, and people with mental illness and chronic diseases are most likely to be impacted by severe heat events, as are People engaged in vigorous outdoor exercise.
Impact on the Economic Condition of the County	The most prominent impact listed [by the National Drought Monitoring Center (NDMC)] is agricultural, followed by fire and social. Social impacts are those associated with the public or recreation/tourism, loss of human life from heat stress, loss of aesthetic values, etc.
Impact on the Public Confidence in Government	Ability to respond and recover may be questioned and challenged if planning, response, and recovery efforts are not timely and effective. The Public holds high expectations of government capabilities for warning, public information, and response related to drought and extreme heat events.

4.7.2.5 Secondary Hazards

The secondary hazard most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends.

Air quality is susceptible to impacts of extreme heat events. The daily air quality index (AQI) indicates how clean or polluted the air is and what associated health effects might be a concern. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country and typically trigger air quality alerts during periods of extreme heat. Excessive heat events can also cause failure of motorized systems such as ventilation systems used to control temperatures inside buildings.

Drought can also have a severe impact on agriculture production, which has both economic and food supply impacts for the county and region.

4.7.2.6 Future Condition Impacts

Local planning documents, such as comprehensive and water master plans, provide capacity at the local municipal level to protect future development from the impacts of drought.

Vulnerability to drought will increase as population growth increases putting more demands on existing water supplies. Future water use planning should consider increase in population as well as potential impacts of climate change. A 2006 report entitled *"Running on Empty? El Paso County Growth and the Denver Basin"*, makes the following observations about water supply and future development in the northern region of the County (Stiedemann, 2006):

> *Water can be obtained through wells that tap groundwater (alluvial aquifers), from surface water (stream systems, lakes, and reservoirs) and from transbasin diversion resources. CSU [Colorado Springs Utility] obtains most of its water from reservoirs on Pikes Peak that collect snow melt and transmountain diversion pipelines which bring water from the Western Slope of the Rocky Mountains. The area studied in this report – the northern unincorporated parts of El Paso County – obtains virtually all its water from the Denver Basin, a sedimentary bedrock aquifer that is renewable only to the degree that it is recharged by precipitation and seasonal runoff […]. New housing starts are booming in this portion of El Paso County. Yet future water supplies are uncertain because groundwater from the basin is currently being pumped with very little recharge. Despite this, El Paso County's population is projected to grow 54 percent from 2000 to 2030, and a substantial portion of the growth is expected to be in this part of the county.*

Colorado Springs Utilities indicates that the region currently has three years' worth of water stored up in reservoirs, irrespective of a drought or no-drought state. Considering regional population growth and expected drought conditions, they anticipate having water supply shortfalls in about 20 years.

One of the most significant impacts of drought is the decreased supply of water for the region's inhabitants. As growth continues, so does the vulnerability for residents and business owners to drought impacts. Careful monitoring of the region's water supply will help drive conservation efforts and potential land use regulations aimed at minimizing drought impacts among other growth-related impacts. CSU has developed numerous programs aimed at conservation of water. The Xeriscape Education program on the CSU website is one example of how it helps with public outreach regarding water conservation efforts.

With a warmer climate, droughts could become more frequent, more severe, and longer lasting. From 1980 to 2019, losses from drought in the U.S. totaled $249 billion (Smith, 2020). More frequent extreme

events such as droughts could end up being more cause for concern than the long-term change in temperature and precipitation averages.

The best advice to water resource managers regarding climate change is to start addressing current stresses on water supplies and build flexibility and robustness into any system. Flexibility helps to ensure a quick response to changing conditions, and robustness helps people prepare for and survive the worst conditions. With this approach to planning, water system managers will be better able to adapt to the impacts of climate change.

According to the U.S. EPA, since 1901, the average surface temperature across the contiguous 48 states has risen at an average rate of 0.14°F per decade (EPA, 2016). NOAA routinely tracks the status of the average global temperature and, through their research, identified a warming trend since the mid-1970s. The warmest years globally have all occurred since 1998, with the top ten being 2016, 2019, 2015, 2017, 2018, 2014, 2010, 2013 and 2005 (tied), and 1998, respectively. This increase in average surface temperatures can also lead to more intense heat waves that can be exacerbated in urbanized areas by what is known as urban heat island effect, where temperatures can be 2 to 10 degrees Fahrenheit warmer than the surrounding rural countryside (EPA, 2020). Additionally, as temperatures rise, so do the number of heat-related illnesses, emergency room visits, and deaths.

To combat the effects of urban heat island effect, communities can implement design standards and urban planning principles that reduce the impacts of excessive heat events.

4.7.2.7 Issues

The planning team has identified the following drought and extreme heat related issues:

- Identification and development of alternative water supplies.
- Utilization of groundwater recharge techniques to stabilize the groundwater supply.
- The probability of increased drought frequencies and durations due to climate change.
- Exacerbated community and regional water supply problems due to lack of planning for long-term sustainability and by inefficient allocation of water property rights (Stiedmann, 2006).
- Deficient wise-water management policies, protective regulations and conservation activities even during non-drought conditions.
- Potential for increased extreme heat events due to climate change.
- Ineffective development strategies to reduce “heat islands”.

4.7.3 LIGHTNING

4.7.3.1 Definition and Extent

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds.

DEFINITIONS

Lightning: A sudden, powerful flow of electricity between electrically charged regions within a thundercloud. Lightning can occur intra-cloud, cloud-to-cloud, or cloud-to-ground.

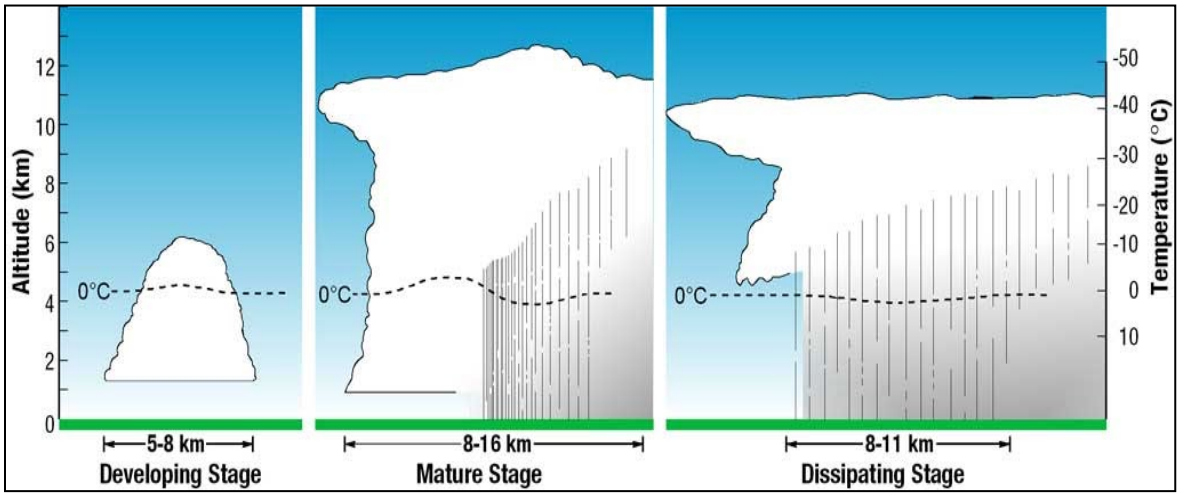
Thunderstorm: A storm featuring heavy rains, strong winds, thunder and lightning, typically about 15 miles in diameter and lasting about 30 minutes. Hail and tornadoes are also dangers associated with thunderstorms. Lightning is a serious threat to human life. Heavy rains over a small area in a short time can lead to flash flooding.

Thunder: The sound caused by lightning, due to the sudden increase in pressure and temperature produced by the rapid expansion of air surrounding and within a bolt of lightning.

Lightning occurs during thunderstorms. Three factors cause thunderstorms to form: moisture, rising unstable air (air that keeps rising when disturbed), and a lifting mechanism to provide the disturbance. The sun heats the surface of the earth, which warms the air above it. If this warm surface air is forced to rise (hills or mountains can cause rising motion, as can the interaction of warm air and cold air or wet air and dry air) it will continue to rise as long as it weighs less and stays warmer than the air around it. As the air rises, it transfers heat from the surface of the earth to the upper levels of the atmosphere (the process of convection). The water vapor it contains begins to cool and it condenses into a cloud. The cloud eventually grows upward into areas where the temperature is below freezing. Some of the water vapor turns to ice and some of it turns into water droplets. Both have electrical charges. Ice particles usually have positive charges, and rain droplets usually have negative charges. When the charges build up enough, they are discharged in a bolt of lightning, which causes the sound waves we hear as thunder. Thunderstorms have three stages (see Figure 4-25):

- The *developing stage* of a thunderstorm is marked by a cumulus cloud that is being pushed upward by a rising column of air (updraft). The cumulus cloud soon looks like a tower (called towering cumulus) as the updraft continues to develop. There is little to no rain during this stage but occasional lightning. The developing stage lasts about 10 minutes.
- The thunderstorm enters the *mature stage* when the updraft continues to feed the storm, but precipitation begins to fall out of the storm, and a downdraft begins (a column of air pushing downward). When the downdraft and rain-cooled air spread out along the ground, they form a gust front, or a line of gusty winds. The mature stage is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes. The storm occasionally has a black or dark green appearance.
- Eventually, a large amount of precipitation is produced and the updraft is overcome by the downdraft beginning the *dissipating stage*. At the ground, the gust front moves out a long distance from the storm and cuts off the warm moist air that was feeding the thunderstorm. Rainfall decreases in intensity, but lightning remains a danger.

Figure 4-25: The Thunderstorm Lifecycle



Lightning is one of the more dangerous weather hazards in the United States and in Colorado. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of $6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

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

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

Lightning in Northeast Colorado Springs on June 23, 1999

Source: Jay Janner/The Gazette.

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

The ratio of cloud-to-ground and intra-cloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year.

U.S. lightning statistics compiled by the National Oceanic and Atmospheric Administration between 1959 and 1994 indicate that most lightning incidents occur during the summer months of June, July, and August and during the afternoon hours from between 2 and 6 p.m.

Lightning magnitude can be measured in voltage. Voltage is equivalent to the work done by an electric current as it flows through a given cross-sectional area in one second. The voltage of lightning varies with certain altitudes and thickness of the bolt. These fluctuating values are caused by the fact that the cloud and earth act as capacitors. A capacitor is a device used to store charge. When the spacing between them increases, the voltage needed to produce lightning increases. So, for a given cloud-to-ground lightning strike voltage can be assumed to increase as the height of the cloud base increases. A comparison of approximated lightning voltage to other common/average voltages demonstrates lightnings massive energy potential.

Table 4-29: Voltage Comparison

Item	Volts
Flashlight battery	1.5
Car battery	12
Supply from power company to consumer	120
Carried in overhead transmission lines	1,000,000
Lightning	120,000,000

4.7.3.2 Previous Occurrences

Historical severe weather data from the National Climatic Data Center Storm Events Database lists 51 significant lighting events in El Paso County between 1994 and 2019, as shown in Table 4-30.

Table 4-30: Partial List of Significant Lighting Events in El Paso County, 1994-2019

Location	Date	Deaths	Injuries	Property Damage	Description
Black Forest	6/12/1996	0	0	$70,000	A Black Forest home was destroyed by a fire started by a lightning strike.
Colorado Springs	8/29/1996	0	0	$200,000	A lightning strike sparked a fire in the attic of a historic parish house at First Lutheran Church.

Location	Date	Deaths	Injuries	Property Damage	Description
Monument	7/6/1997	1	0	0	A 39-year-old man was struck and seriously burned by a lightning bolt in a small open field in Monument. He was transported to a Denver hospital for treatment, but died the next day.
Colorado Springs	7/6/1998	0	0	$50,000	Lightning struck a roof and ignited a two-alarm fire in the attic of a second floor apartment unit.
Colorado Springs	7/10/1998	0	0	$85,000	Two houses were damaged due to fires caused by lightning strikes. One strike caused $10,000 worth of damage; and the other caused $75,000 worth of damage.
Colorado Springs	5/24/1999	0	3	0	A 14-year old girl sustained minor burns from a lightning flash, and was taken to the hospital and treated. Two other girls were nearby and were stunned by the lightning flash. The lightning in that area knocked out power to over 3,000 customers.
Colorado Springs	8/19/1999	0	8	0	A lightning flash struck close to the Grace Fellowship Church's football team, sending a side flash into the group. Eight team members were knocked to the ground, but no one was seriously injured.
Colorado Springs	7/25/2000	1	0	0	18-year-old male was killed by initial lightning strike of a developing thunderstorm as he was standing in a boulder field near the top of Pikes Peak.
Colorado Springs	8/2/2000	0	0	$75,000	A lightning flash hit a residence which sustained roof and attic damage. The lightning storm also caused power failures across the northern part of the city, affecting just over 300 residences for about 30 minutes.
Ft Carson	5/30/2001	1	3	0	Four soldiers on Fort Carson were struck by lightning. Three were taken to area hospitals, treated and released. The other remained in a coma for three weeks, and died of his injuries on June 20th.
Colorado Springs	7/12/2001	0	0	$420,000	A lightning strike hit the summit house atop Pikes Peak, causing a large electrical fire which caused major damage to the electrical wiring, and other equipment.
Colorado Springs	7/13/2001	0	0	$100,000	A lightning strike hit a residence causing a fire which was extinguished in about 30 minutes.
Chipita Park	7/13/2003	0	1	0	A 41-year-old male was the victim of a nearby lightning strike. He was getting food out of the back of an SUV when struck. CPR was performed on the victim by a friend, and he was then taken to the hospital.
Monument	7/25/2003	0	1	0	A 20-year-old woman was struck by lightning on a golf course. An off-duty police officer gave first aid to the woman, who was then taken to the hospital.
Monument	8/5/2003	1	0	0	A golfer was struck and killed by lightning on a local golf course.

Location	Date	Deaths	Injuries	Property Damage	Description
Colorado Springs	8/23/2003	0	3	0	Three children, 9, 11, and 13 years old were struck by lightning under a tree while crossing a golf course.
Colorado Springs	9/2/2007	1	3	0	Four people seeking shelter in a tent on a ridge along Gold Camp Road in western El Paso County were struck by lightning. One fatality occurred, and the three other people were injured.
Colorado Springs Airport	6/24/2008	0	2	0	Two police officers received a side-flash of current from a lightning strike which hit a parking lot light at a sports complex. The officers were taken to the hospital, where one was in fair condition, and the other was in good condition.
Falcon	7/27/2009	0	0	$200,000	Lightning struck a house in Falcon. The house was destroyed by fire.
Colorado Springs	8/6/2009	0	0	$20,000	Lightning caused a house fire on the southwest side of Colorado Springs. A firefighter was slightly injured while working the fire.
Schriever Afb	7/24/2011	0	5	0	Lightning struck at the Aztec Family Raceway, injuring five people.
Fountain	7/31/2013	0	12	0	Twelve soldiers, involved in training exercise, were struck by lightning south of Butts Field on the north side of Fort Carson. Two soldiers were taken to a hospital in Colorado Springs, one in critical condition. The other ten soldiers were taken to the base hospital and later released.
Falcon	6/24/2015	0	5	0	A lightning strike affected five people at a construction site in the northeast part of Colorado Springs. No one was seriously injured.
Calhan	7/19/2016	0	3	0	A lightning strike injured three people at the El Paso County Fairgrounds.

Data from the National Weather Service ranks Colorado 19th in the Nation with respect to the number of cloud-to-ground lightning flashes (2009-2018) with an average number of more than 500,000 cloud-to-ground lightning strikes per year. El Paso County has an average of 2 to 5 lightning flashes per square kilometer per year, with higher lightning frequency in the northwestern part of the county, as shown by the flash density map in Figure 4-26.

Figure 4-26: Colorado Annual Lightning Flash Density, 1996-2016

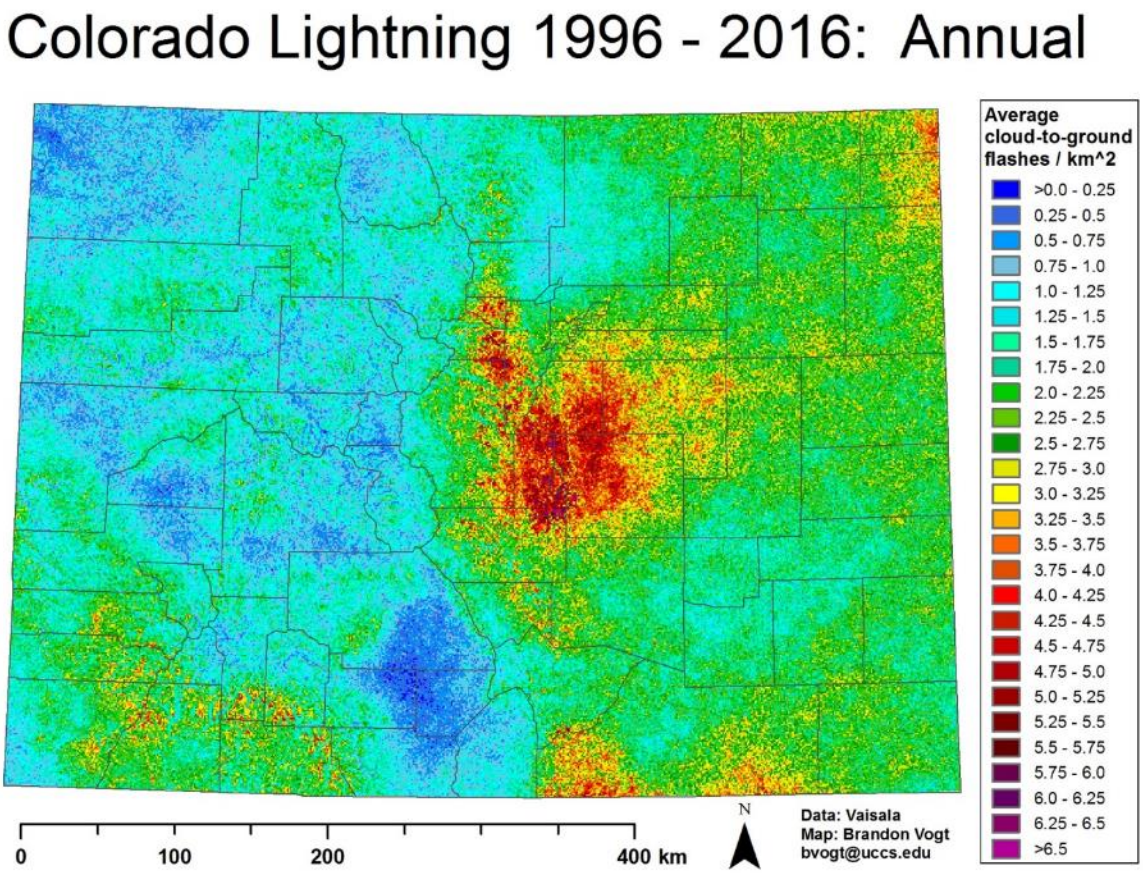
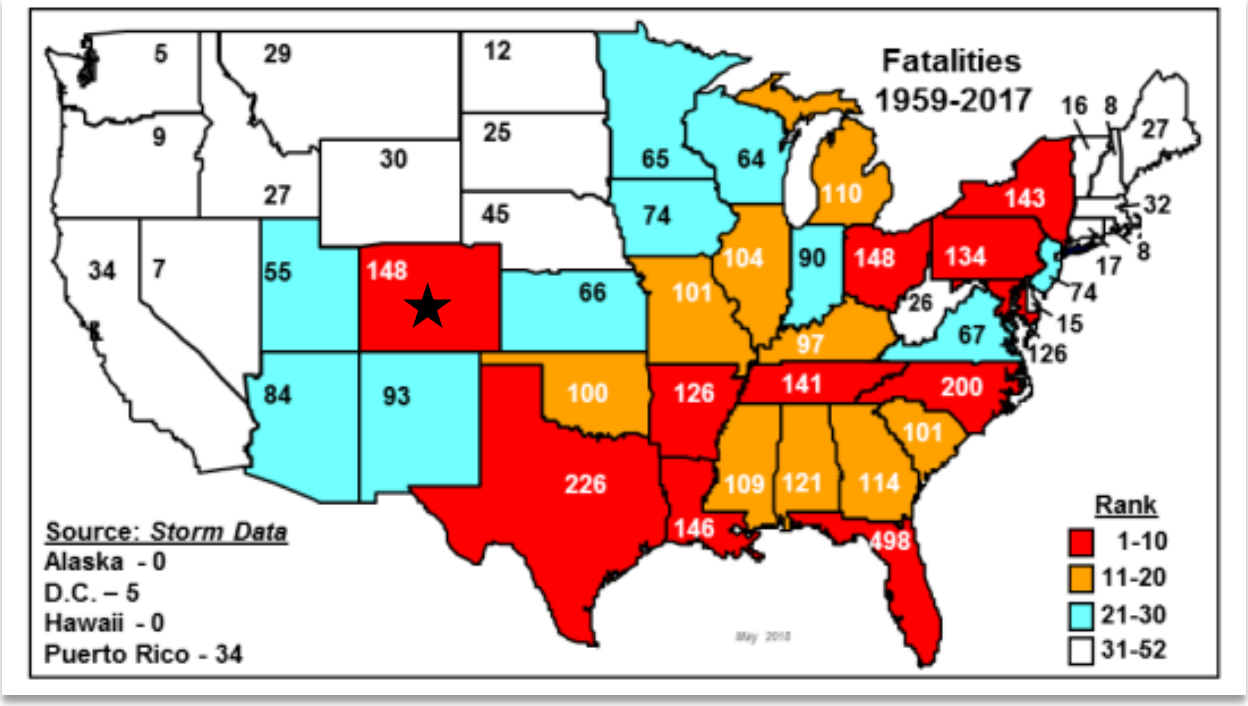


Figure 4-27 illustrates the number of lightning related fatalities by state from 1959-2017. Colorado and Ohio (148 fatalities) ranked 4th in the U.S., following North Carolina (200), Texas (226), and Florida (498) in lightning deaths. Within Colorado, El Paso County has the highest recorded number of lightning casualties (fatalities + injuries), totaling 94 casualties between 1981 and 2016.

Figure 4-27: Lightning Fatalities in The United States, 1959-2017



Source: National Weather Service, https://www.weather.gov/safety/lightning

4.7.3.3 Vulnerability

Lightning has the potential to injure or kill people and damage structures either directly or by subsequent wildfire. Communications systems are also at risk. The Pikes Peak Region is certainly vulnerable to future lightning strikes judging by historical evidence. As a gateway into National Forest Land, the vast recreation opportunities in and around region place hikers, bikers, campers, among others at risk during major electrical storms.

Table 4-31: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Environmental Damage	Overall Risk Score
Calhan	Likely	Limited	Moderate	Moderate	Minor	Low
Colorado Springs	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
El Paso County	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Fountain	Likely	Limited	Significant	Moderate	Minor	Moderate
Green Mtn Falls	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Manitou Springs	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Monument	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Palmer Lake	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Ramah	Likely	Limited	Moderate	Moderate	Minor	Low

Regionwide	Highly likely	Limited	Significant	Moderate	Minor	Moderate

Spatial Extent and Geographic Location

The entire extent of El Paso County is exposed to some degree of lightning hazard, though exposed points of high elevation have significantly higher frequency of occurrence.

Probability of Future Occurrence

Highly Likely: Near 100% annual probability. According to historical data, 51 significant lightning events were recorded in El Paso County over 25 years. As such, a damaging lightning strike can be anticipated approximately twice per year in El Paso County.

Magnitude / Severity

Although the frequency of lightning events is relatively high, the magnitude is limited. Generally, damage is limited to single buildings and in most cases, personal hazard insurance covers any losses. Lightning can cause deaths, injuries, and property damage; including damage to buildings, communications systems, power lines, and electrical systems. However, the number of reported casualties and infrastructure losses from lightning is likely to be **limited**. The relationship of lightning to wildfire ignitions in the County increases the significance of this hazard.

Warning Time

Meteorologists can often predict the likelihood of a severe storm that produces lightning. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time.

Exposure and Losses

➢ Property

There are 227,356 buildings within the planning area. All of these buildings are considered to be exposed to the lightning hazard, but structures in particularly vulnerable locations (located on hilltops or exposed open areas) may risk the most damage. The frequency and degree of damage will depend on specific locations.

Loss estimations for the lightning hazard are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent, 50 percent, and 100 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 4-32 lists the loss estimates for the general building stock with exposure to the lightning hazard.

Table 4-32: Loss Estimates for the General Building Stock for Jurisdictions that have an Exposure to Lightning

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Estimated Loss Potential			
			10% Damage	30% Damage	50% Damage	100% Damage
Calhan	511	100%	$5,845,421	$17,536,263	$29,227,106	$58,454,211
Colorado Springs	137,504	100%	$4,831,347,170	$14,494,041,511	$24,156,735,851	$48,313,471,703
El Paso County	74,432	100%	$1,830,048,987	$5,490,146,961	$9,150,244,935	$18,300,489,870
Fountain	8,677	100%	$203,673,779	$611,021,338	$1,018,368,896	$2,036,737,793
Green Mtn Falls	377	100%	$8,072,542	$24,217,626	$40,362,711	$80,725,421
Manitou Springs	2,134	100%	$65,589,223	$196,767,670	$327,946,116	$655,892,232
Monument	2,373	100%	$93,071,660	$279,214,981	$465,358,302	$930,716,603
Palmer Lake	1,257	100%	$32,015,850	$96,047,550	$160,079,250	$320,158,500
Ramah	91	100%	$525,105	$1,575,314	$2,625,524	$5,251,048
Regionwide	227,356	100%	$7,070,189,738	$21,210,569,214	$35,350,948,690	$70,701,897,380

➢ Population

It can be assumed that the entire planning area is exposed to some extent to lightning strikes. Certain areas are more exposed due to geographic location and local weather patterns, such as the northwestern portion of the County. All populations are vulnerable to lightning strikes; however, those working or recreating outdoors are more vulnerable.

➢ Environment

The environment is highly exposed to lightning strikes. Most lightning strikes will damage limited areas, however, lightning strikes commonly spark wildfires; thus, greatly expanding the area impacted.

➢ Critical Facilities and Infrastructure

Limited interruption of essential facilities and services for less than 24 hours. All critical facilities are likely exposed to risks associated with lightning strikes. The most common problems associated with lightning is loss of power. Phone, water, and sewer systems may not function. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

4.7.3.4 Consequence Analysis

Lightning Consequence Analysis	
Category	**Narrative**
Hazard Description	Although the frequency of lightning events is relatively high, the magnitude is limited. Generally, damage is limited to single buildings and in most cases, personal

	hazard insurance covers any losses. 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.
Impact to Property, Facilities, and Infrastructure	Minimal property damage that does not threaten structural stability. Lightning affects the entire planning area, including all above-ground structures and utilities. Assets in areas with higher flash counts are at greater risk. Instances of property losses due to trees or rooftops being struck. Power outages may occur if utility lines are downed by lighting or wind. Communications systems are also at risk. Structure damage due to lightning is usually covered under private insurance. Personal injury can also occur as a result of lightning if individuals are outdoors. Damage and injuries caused by lightning are typically the result of ensuing fires.
Impact on the Environment	Lightning can impact the environment by damaging sewer and wastewater treatment plants. Additionally, lightning can cause wildfires and subsequently displaced animals.
Impact on Responders	Fire and police, and emergency responders are called on to the impacted area to close roads, attend to the injured, and direct traffic away from the disaster area. Exposure exists to personnel performing routine duties when event occurs; storm-related duties are primarily post-event; however, unsafe structural or environmental conditions may persist during the response period. Lightning can also cause added danger to motorcycle officers.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Interruption of essential facilities and services for less than 24 hours. Limited loss of facilities or infrastructure function or accessibility, or ability to provide services. May have limited power interruption if not adequately equipped with backup generation. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from lightning.
Impact on the Public	Minor injuries and illnesses. Lightning has the potential to injure or kill people and damage structures either directly or by subsequent wildfire. Communications systems are also at risk. Outdoor workers, outdoor recreationists, outdoor sporting participants are the populations most at risk. The American Red Cross would be asked to provide shelters and attend to the injured. The Humane Society of the Pikes Peak Region would be asked to provide shelters for all animals. Members of the Voluntary Organizations Active in Disasters would be requested to assist with recovery.
Impact on the Economic Condition of the County	Although the frequency of lightning events is relatively high, the magnitude is limited. Generally, damage is limited to single buildings and in most cases, personal hazard insurance covers any losses. Extended power outages may cause delays in work.
Impact on the Public Confidence in Government	Characteristics of lightning flashes such as duration and speed of onset result in limited response and recovery functions for government beyond first responders.

4.7.3.5 Secondary Hazards

The most significant secondary hazards associated with lightning strikes are wildfire and power outages.

4.7.3.6 Future Condition Impacts

All future development will be affected by lightning; however, impacts are likely to be highly localized. Most structures built to International Building Code are able to withstand the impact of lightning; however, lightning strikes are capable of sparking structure and wildfires. Lightning rod/grounding systems can improve the performance of a building during such an event. Fire codes in place result in less structure damage caused by lightning-sparked fires. Increasing population growth and development increases vulnerability to lightning.

Climate change presents a significant challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. Historical data shows that the probability for severe weather events increases in a warmer climate (see Figure 4-21). The changing hydrograph caused by climate change could have a significant impact on the intensity, duration and frequency of storm events. All of these impacts could have significant economic consequences. A study by Colin Price analyzed likely impacts of climate change on lightning strikes and concluded that Climate model studies show that in a future warmer climate we may have fewer, but more violent thunderstorms, "which may increase the amount of lightning by 10 percent for every one degree global warming" (Price, 2008).

4.7.3.7 Issues

Important issues associated with the lightning hazard in the planning area include the following:

- Effective public education lightning hazard campaigns to reduce injuries and fatalities.
- Lightning strikes are common in the Pikes Peak Region and cause limited property damage on a regular basis.

4.7.4 TORNADO

4.7.4.1 Definition and Extent

Tornadoes are violently rotating columns of air, formed by a combination of atmospheric instability and wind shear. Instability occurs when warm, moist air is wedged under drier, cooler air aloft. This warm air rises, causing the intense updrafts and downdrafts seen in strong thunderstorms — the incubators of tornadoes. Wind shear refers to changes in wind direction and speed at different elevations in the atmosphere. The combination of instability and wind shear forms the rotating column of air that we associate with a tornado. Tornadoes that form over water are known as waterspouts. Tornadoes that do not reach the ground surface are simply referred to as funnel clouds.

DEFINITIONS

Tornado: A narrow, violently rotating column of air that extends from the base of a cumulonimbus cloud to the ground.

Enhanced Fujita Scale: A tornado rating system that is a set of wind estimates based on damage.

Wind speeds in a tornado can reach up to 300 mph, and they usually form inside intense, rotating thunderstorms that may also produce large hail. They can have the same pressure differential that fuels huge hurricanes but do so on a much smaller scale.

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, most injuries and deaths result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response.

Tornadoes were previously classified by their intensity using the Fujita (F) Scale, with F0 being the least intense and F6 being the most intense. The Fujita Scale was used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure.

On February 1, 2007, the Fujita scale was decommissioned in favor of the more accurate Enhanced Fujita Scale (aka the EF Scale). The EF-Scale measures tornado strength and associated damages and classifies tornadoes into six intensity categories, as shown in Table 4-33. The scale was revised to reflect better examinations of tornado damage surveys, to align wind speeds more closely with associated storm damage. The new scale considers how most structures are designed and is thought to be a much more accurate representation of the surface wind speeds in the most violent tornadoes.

Table 4-33. Enhanced Fujita (EF) Scale

Enhanced Fujita Category	Wind Speed (mph)	Potential Damage
EF0	65-85	**Light damage**: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	**Moderate damage**: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage**: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage**: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage**: Well-constructed houses and whole frame houses completely leveled; cars thrown, and small missiles generated.
EF5	>200	**Incredible damage**: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly more than 100 m (109 yds.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration

4.7.4.2 Previous Occurrences

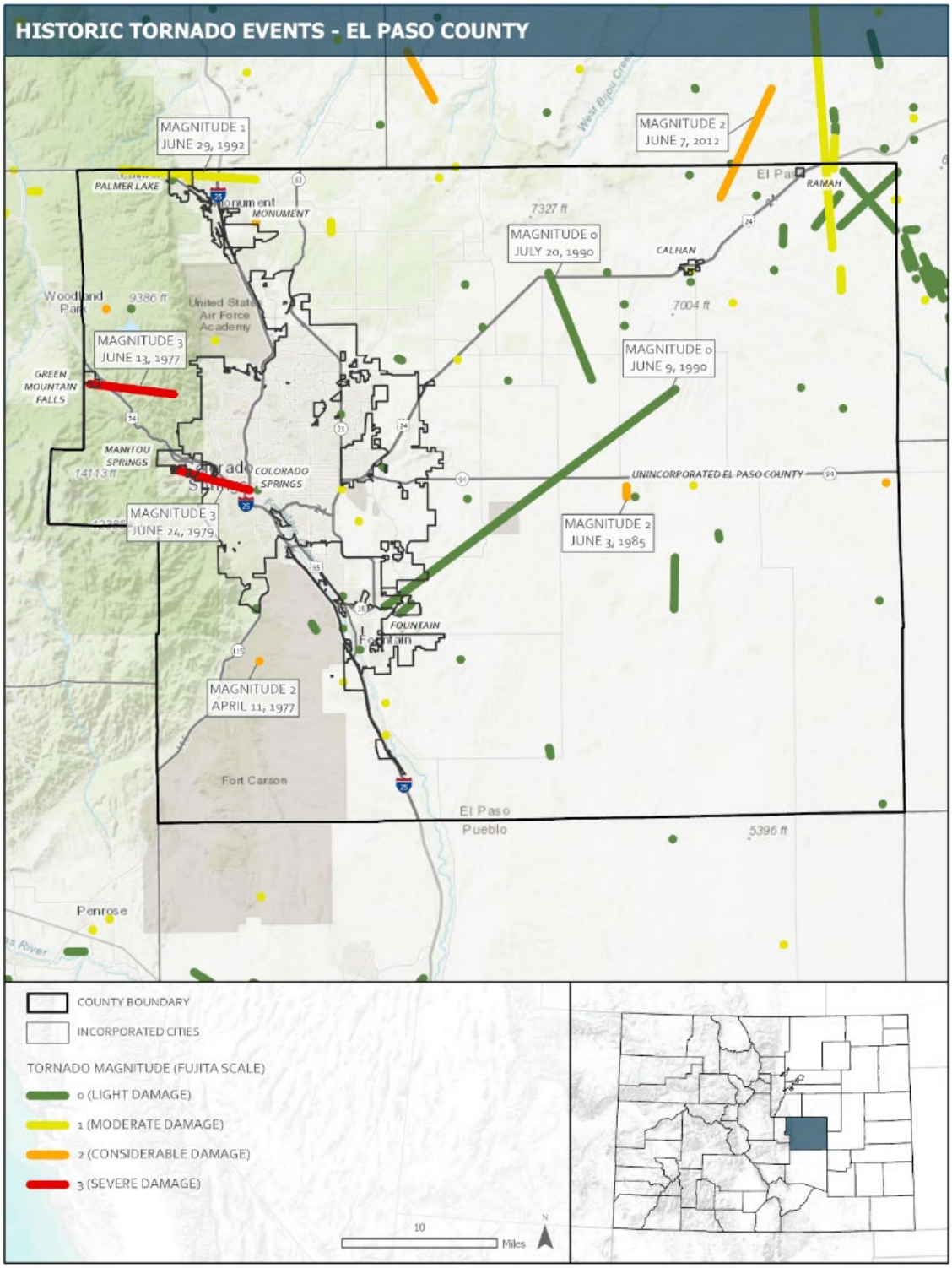
Table 4-34 lists tornadoes recorded by the National Climatic Data Center's Storm Events Database for El Paso County from 1980 to 2020. The paths and ratings of previous tornadoes in El Paso County are shown on Figure 4-28.

Table 4-34: Tornadoes in El Paso County, 1980 – 2020

Date	Start Location	End Location	Tornado Rating	Property Damage	Tornado Length (Miles)	Tornado Width (Yards)
7/27/1981	Unavailable	Unavailable	F0	0	0.5	30
8/2/1981	Unavailable	Unavailable	F0	0	0.5	17
8/10/1982	Unavailable	Unavailable	F1	$30	1	60
6/10/1984	Unavailable	Unavailable	F1	0	2	50
6/3/1985	Unavailable	Unavailable	F1	0	0.5	50
6/9/1985	Unavailable	Unavailable	F1	$25,000	2	50
6/6/1990	Unavailable	Unavailable	F0	0	0.1	10
6/6/1990	Unavailable	Unavailable	F0	0	0.2	10
6/6/1990	Unavailable	Unavailable	F2	$250,000	2	100
6/6/1990	Unavailable	Unavailable	F0	0	0.1	10
6/9/1990	Unavailable	Unavailable	F0	0	0.2	30
6/9/1990	Unavailable	Unavailable	F0	$2,500	0.1	13
6/9/1990	Unavailable	Unavailable	F0	0	20	50
7/9/1990	Unavailable	Unavailable	F0	0	0.1	10
7/20/1990	Unavailable	Unavailable	F0	0	4	23
7/20/1990	Unavailable	Unavailable	F0	0	1	13
7/20/1990	Unavailable	Unavailable	F0	0	0.1	13
7/20/1990	Unavailable	Unavailable	F0	0	0.1	10
5/22/1991	Unavailable	Unavailable	F0	0	0.2	10
5/22/1991	Unavailable	Unavailable	F0	0	0.2	10
5/22/1991	Unavailable	Unavailable	F0	0	0.2	10
5/22/1991	Unavailable	Unavailable	F0	0	3	50
5/22/1991	Unavailable	Unavailable	F0	0	0.2	10
6/21/1991	Unavailable	Unavailable	F0	0	0.1	10
6/21/1991	Unavailable	Unavailable	F0	0	0.1	10
6/21/1991	Unavailable	Unavailable	F0	0	0.1	10
6/21/1991	Unavailable	Unavailable	F0	0	0.1	10
6/21/1991	Unavailable	Unavailable	F0	0	0.1	10
6/21/1991	Unavailable	Unavailable	F0	0	0.1	10
6/21/1991	Unavailable	Unavailable	F0	0	0.1	10
6/20/1992	Unavailable	Unavailable	F0	0	0.1	10
6/20/1992	Unavailable	Unavailable	F0	0	0.1	10
6/20/1992	Unavailable	Unavailable	F0	0	1	50

Date	Start Location	End Location	Tornado Rating	Property Damage	Tornado Length (Miles)	Tornado Width (Yards)
6/24/1992	Unavailable	Unavailable	F0	0	0.1	10
6/26/1992	Unavailable	Unavailable	F0	0	0.1	10
6/29/1992	Unavailable	Unavailable	F1	0	3	100
7/8/1992	Unavailable	Unavailable	F0	0	0.1	10
4/25/1994	Ft. Carson	Unavailable	F0	0	0.1	10
4/25/1994	Unavailable	Unavailable	F0	0	0.1	10
6/22/1995	Falcon	Unavailable	F1	$200,000	2	50
8/4/1995	Co Springs	Unavailable	F0	0	0.1	10
7/3/1998	Co Springs	Co Springs	F0	0	0.1	50
5/25/2000	Rush	Rush	F0	$5,000	0.5	30
7/20/2000	Co Springs	Co Springs	F0	0	0.1	25
5/28/2001	Ellicott	Ellicott	F2	$8,000,000	0.5	200
5/28/2001	Ellicott	Ellicott	F1	$20,000	0.1	50
5/28/2001	Ellicott	Ellicott	F2	$100,000	0.3	30
5/28/2001	Ellicott	Ellicott	F0	0	0.1	25
5/28/2001	Rush	Rush	F0	0	0.1	50
5/28/2001	Peyton	Peyton	F0	0	0.1	50
5/29/2001	Yoder	Yoder	F0	0	0.2	50
6/20/2004	Black Forest	Black Forest	F1	0	1	75
6/20/2004	Truckton	Truckton	F0	0	0.5	50
8/9/2004	Calhan	Calhan	F0	0	0.5	50
9/30/2004	Black Forest	Black Forest	F0	0	1	100
8/21/2005	Falcon	Falcon	F0	0	0.1	50
8/13/2008	Ramah	Ramah	EF1	$10,000	1.3	100
5/19/2011	Fountain	Fountain	EF0	$20,000	1	75
8/26/2011	Ft Carson	Ft Carson	EF0	0	0.11	50
4/26/2012	Yoder	Yoder	EF0	$10,000	0.35	20
6/7/2012	Ramah	Calhan	EF1	$50,000	2.21	100
6/7/2012	Ramah	Ramah	EF0	0	0.48	75
7/9/2012	Ft Carson	Ft Carson	EF0	0	0.52	50
7/12/2014	Fountain	Fountain	EF0	0	0.53	50
5/9/2015	Truckton	Ellicott	EF0	0	3.32	100
6/4/2015	Ramah	Ramah	EF1	$2,000	0.33	100
6/4/2015	Ramah	Ramah	EF0	0	0.11	100
6/4/2015	Ramah	Ramah	EF0	$2,000	5.05	200
9/9/2017	Falcon	Falcon	EF0	0	0.28	50
3/29/2019	Falcon	Falcon	EF0	0	1.17	25
8/8/2019	Falcon	Falcon	EF0	0	0.5	10

Figure 4-28: Historic Tornado Events in El Paso County from 1951 to 2018



Descriptions of some of El Paso Counties more significant tornadoes that caused damage are as follows:

- On May 28, 2001, an F2 tornado touched down near Ellicott, destroying over 30 homes, damaging another 70, and severely damaging the Ellicott High School. Had the tornado occurred during a school day, there would have been a significantly higher number of injuries or deaths.
- On June 7, 2012, a tornado passed through eastern El Paso County just after dark and with almost no warning. The tornado caused significant damage to at least one house west of Ramah (Steiner, 2013).
- On June 4, 2015, a severe storm produced severe hail, damaging winds, and three tornados in northeast El Paso County. One of the tornados moved from Elbert County into El Paso County and damaged some trees and road signs. The damage to the trees was consistent with EF1 winds.
- On March 29, 2019, a relatively weak supercell thunderstorm developed over north-central El Paso County, Colorado after 3:00 PM on March 29th. Thereafter, as mid-level rotation increased in the storm, it advanced southeast between Falcon and Peyton. A severe thunderstorm warning with a "tornado possible" tag was issued at 4:06 PM by the NWS in Pueblo, CO. By around 4:15 PM, the storm had produced a weak mesocyclone tornado in northern parts of Falcon, as was evidenced by numerous photos and videos. The greatest tornado damage was limited to flipped RVs/campers and damage to the wall of a residence. No severe hail was reported with this storm. The damage survey concluded EF-0 tornado damage with estimated wind speeds up to 85 mph. According to data archives dating back to 1951, this appears to be the first reported tornado in El Paso County in the month of March. Temperatures were only in the mid-40s ahead of the tornado, and snow fell across the tornado path shortly after the storm moved through.

Tornado on March 29, 2019

Source: NWS

Tornadoes have been reported nine months of the year in Colorado, with peak occurrences between mid-May through mid-August. June is the peak month for tornado activity in Colorado with May and July tied for second place. This is apparently evident in the Pikes Peak region as well, as evidenced in Table 4-34. Additionally, tornadoes in Colorado are primarily occur between 11am-11pm with the main peak being between 2pm-7pm (Spears, no date).

Figure 4-29: Colorado Tornadoes by Month, 1950-2012Figure 4-29 shows the number of tornadoes by month in Colorado and Figure 4-30 identifies the frequency of tornadoes by hour.

Figure 4-29: Colorado Tornadoes by Month, 1950-2012

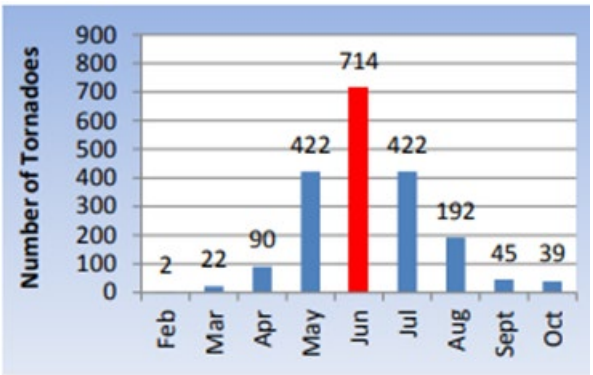
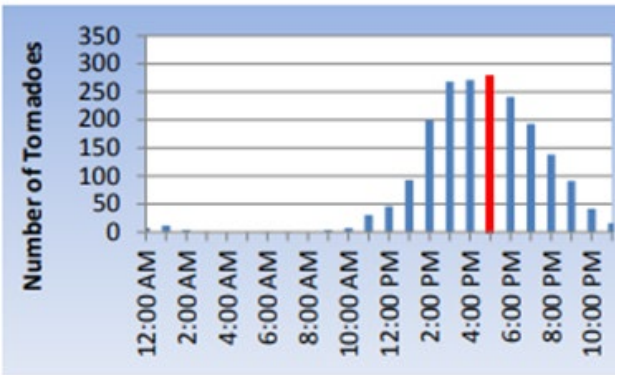


Figure 4-30: Colorado Tornadoes by Hour, 1950-2012



Source:https://climate.atmos.colostate.edu/pdfs/Climatology_of_Colorado_Tornadoes.pdf

4.7.4.3 Vulnerability

Table 4-35: Risk Score Summary

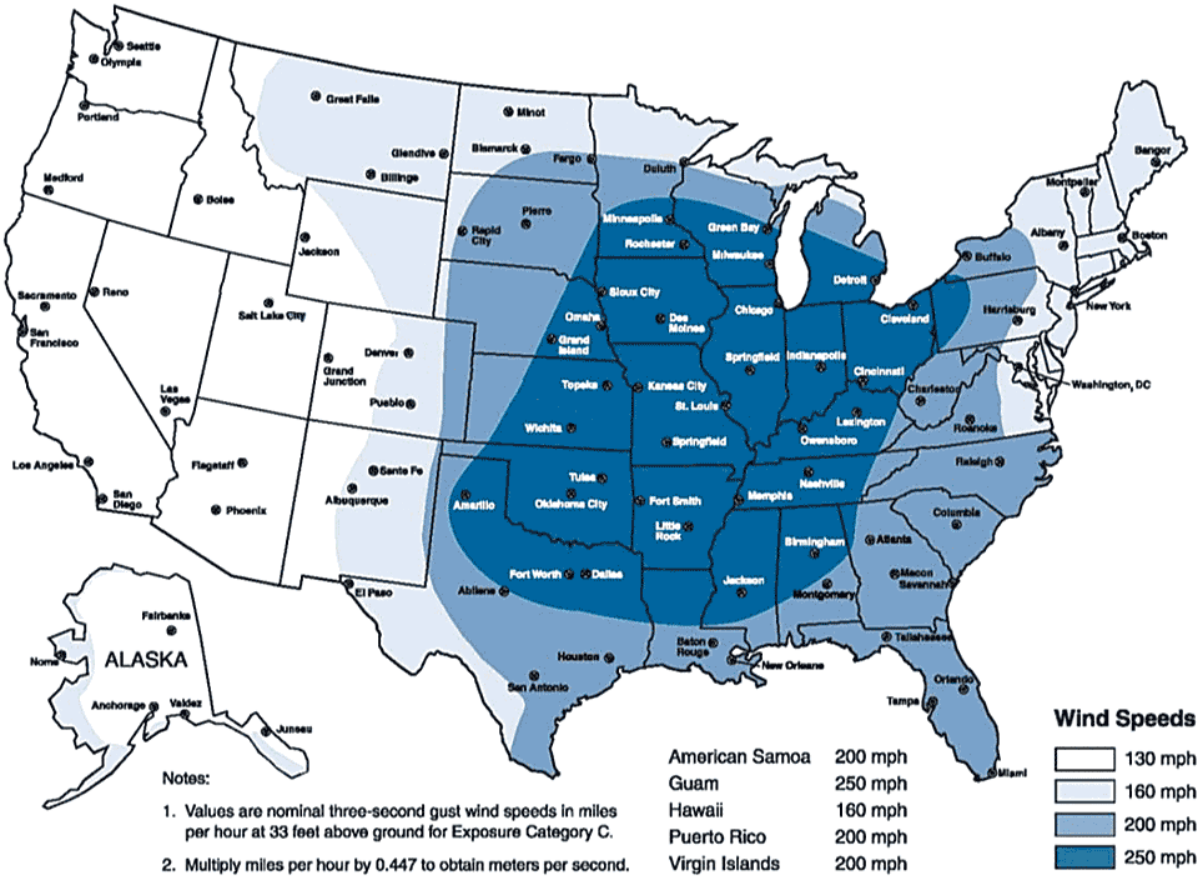
	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Environmental Damage	Overall Risk Score
Calhan	Occasional	Limited	Significant	Moderate	Minor	Moderate
Colorado Springs	Likely	Limited	Significant	Moderate	Minor	Moderate
El Paso County	Highly Likely	Limited	Significant	Moderate	Minor	Moderate
Fountain	Likely	Limited	Significant	Moderate	Minor	Moderate
Green Mtn Falls	Occasional	Minor	Limited	Moderate	Minor	Low
Manitou Springs	Occasional	Minor	Limited	Moderate	Minor	Low
Monument	Occasional	Minor	Limited	Moderate	Minor	Low
Palmer Lake	Occasional	Minor	Limited	Moderate	Minor	Low
Ramah	Occasional	Limited	Significant	Moderate	Minor	Moderate
Regionwide	Highly Likely	Limited	Significant	Moderate	Minor	Moderate

Spatial Extent and Geographic Location

The topography of El Paso County limits the occurrence of most tornadoes to the central and eastern portion of the County, but they can occur countywide. As an example, a tornado occurred on the western edge of the County in the mountains north of Green Mountain Falls during the summer of 2007 (outside El Paso County in Teller County). Damage consisted solely to forested areas. The majority of tornadoes occur to the east of Colorado Springs in the vicinity of Ellicott, Peyton, Ramah, Calhan, and Yoder. According to a news article published in *The Gazette* "roughly 95 percent of [tornadoes] occur along Interstate 25 to the east on the plains where there is more moisture and heat." (Wells, 2013).

FEMA's Tornado Safe Room Design Wind Speed Map, Figure 4-31, shows El Paso County to be located in an area with tornado winds of up to 160 mph.

Figure 4-31: Tornado Safe Room Design Wind Speed Map



Source: The International Institute of Building Enclosure Consultants

Probability of Future Occurrence

Highly Likely: Near 100% annual probability of occurrence in El Paso County. Frequency is more likely in the eastern region of the County, particularly northeast El Paso County near Ramah. Table 4-34 lists 71 recorded tornadoes between 1980 and 2020; however, many of those are multiple tornadoes during a single weather event. Tornadoes occurred in El Paso County on 40 separate dates during that 40-year time period. This makes the average probability of tornadoes in El Paso County approximately one event per year.

Magnitude / Severity

Tornadoes are potentially the most dangerous of local storms. Fortunately, most tornadoes in Colorado are weak with wind speeds of less than 110 miles per hour. Many tornadoes make landfall in the rural areas of El Paso County. However, if a major tornado were to strike within the populated areas of El Paso

County, damage could be widespread. Businesses could be forced to close for an extended period or permanently, fatalities could be high, many people could be homeless for an extended period, and routine services such as telephone or power could be disrupted. Buildings may be damaged or destroyed. The overall impact for the tornado hazard is low, with **limited to minor** potential impact.

Warning Time

Moderate: 6 to 12 hours.

NOAA's storm prediction center issues tornado watches and warnings for El Paso County:

- **Tornado Watch** - Tornadoes are possible. Remain alert for approaching storms. Watch the sky and stay tuned to NOAA Weather Radio, commercial radio or television for information.
- **Tornado Warning** - A tornado has been sighted or indicated by weather radar. Take shelter immediately.

Once a warning has been issued, residents may have only a matter of seconds or minutes to seek shelter.

Exposure and Losses

➢ Property

All property is vulnerable during tornado events, but properties in poor condition or in particularly vulnerable locations may risk the most damage.

➢ Population

It can be assumed that the entire planning area is exposed to some extent to tornado events. Although, certain areas, such as the eastern portion of the County including the towns and communities of Ellicott, Peyton, Calhan, Ramah, and Yoder, are more exposed due to geographic location and local weather patterns.

Vulnerable populations are the elderly, low income, or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure after tornado events and could suffer more secondary effects of the hazard.

Individuals caught in the path of a tornado who are unable to seek appropriate shelter are especially vulnerable. This may include individuals who are out in the open, in cars, have mobility issues, or who do not have access to basements, cellars, or safe rooms.

➢ Environment

Environmental features are exposed to tornado risk, although damages are generally localized to the path of the tornado. If tornados impact facilities that store hazardous materials, areas impacted by material releases may be especially vulnerable.

➢ Critical Facilities and Infrastructure

Tornadoes can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation networks, isolating populations, and disrupting ingress and egress. Of particular concern are roads providing access to isolated areas and to the elderly. Any facility that is in the path of a tornado is likely to sustain damage.

4.7.4.4 Consequence Analysis

Tornado Consequence Analysis	
Category	**Narrative**
Hazard Description	Most tornadoes in Colorado are weak with wind speeds of less than 110 miles per hour. Many tornadoes make landfall in the rural areas of El Paso County. However, should a tornado touch down within the city limits in a heavily populated area, the damage could be devastating.
Impact to Property, Facilities, and Infrastructure	Tornadoes can cause significant damage to structures, trees, utilities, crops, vehicles, and/or any unsecured property. Tornadoes affect the entire planning area, including all above-ground structures and utilities. Due to the erratic movement of tornadoes, destruction often appears random. There is no specific identified hazard area as the entire region is susceptible to tornadoes. With advance warning, people can evacuate to safe rooms, or to more structurally sound areas within the building. Basements are considered one of the safest places to retire during a tornadic event. Potential impact to water treatment facilities, government buildings, public safety facilities and equipment, and healthcare services.
Impact on the Environment	Significant impact related to tree damage; possible cascading water quality issues from damaged water treatment facilities. Debris issues. Displaced animals. Local tornadoes are less severe and typically do not have a path, with isolated damage in random locations. This can cause extreme damage to the environment in isolated locations making it difficult to respond to and recover from.
Impact on Responders	Exposure exists to personnel performing routine duties when event occurs; storm-related duties are primarily post-event; however unsafe structural or environmental conditions may persist during the response period. Fire and police, and emergency responders are called on to the impacted area to close roads, attend to the injured, and direct traffic away from the disaster area. The American Red Cross would be asked to provide shelters and attend to the injured. The Humane Society of the Pikes Peak Region would be asked to provide shelters for all animals. Members of the Voluntary Organizations Active in Disasters would be requested to assist with recovery. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by flooded roadways.

	Infrastructure personnel may also be considered responders due to responsibilities and would also be impacted by the effects of a tornado event.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Loss of facilities or infrastructure function or accessibility, or ability to provide services. Power interruption is likely if not adequately equipped with backup generation. Interruption of essential facilities and services for 24-72 hours. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from tornadoes.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses. With advance warning, people can evacuate to safe rooms, or to more structurally sound areas within the building. Basements are considered one of the safest places to retire during a tornadic event. Anyone without adequate shelter during an event are most at risk.
Impact on the Economic Condition of the County	Should a tornado touch down within a heavily populated area, the damage [and impact on the economy] could be devastating. Potential loss of facilities or infrastructure function or accessibility and uninsured damage. Impact to transportation sector and movement of goods.
Impact on the Public Confidence in Government	The public holds high expectations of government capabilities for warning, public information, and response and recovery activities related to a tornado. There are high expectations for rapid restoration of critical lifelines.

4.7.4.5 Secondary Hazards

Tornadoes may cause loss of power if utility service is disrupted. Additionally, fires may result from damages to natural gas infrastructure. Hazardous materials may be released if a structure is damaged that houses such materials or if such a material is in transport.

4.7.4.6 Future Condition Impacts

Continuing development pressures along the Front Range will likely increase the overall vulnerability to tornadoes. Building codes in place can reduce the overall impacts; however, significant tornadoes are unpredictable and are capable of destroying buildings with incredible structural integrity. As the Region grows, development to the east, in lower elevations, will be particularly more vulnerable to tornadoes, as most of the tornados recorded in the County occurred farther away from the foothills.

Climate change impacts on the frequency and severity of tornadoes are unclear. According to the Center for Climate Change and Energy Solutions, “Researchers are working to better understand how the building blocks for tornadoes -- atmospheric instability and wind shear -- will respond to global warming. It is likely that a warmer, moister world would allow for more frequent instability. However, it is also likely that a warmer world would lessen chances for wind shear. Recent trends for these quantities in the Midwest during the spring are inconclusive. It is also possible that these changes could shift the timing of tornadoes or regions that are most likely to be hit” (Center for Climate and Energy Solutions, no date).

4.7.4.7 Issues

Important issues associated with a tornado in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to tornadoes.
- Redundancy of power supply must be evaluated.
- The capacity for backup power generation is limited.
- Roads and bridges blocked by debris or otherwise damaged might isolate populations.
- Warning time may not be adequate for residents to seek appropriate shelter or such shelter may not be widespread throughout the planning area.
- The impacts of climate change on the frequency and severity of tornadoes are not well understood.

4.7.5 WIND

4.7.5.1 Definition and Extent

DEFINITIONS

Windstorm: A storm featuring violent winds. Windstorms tend to damage ridgelines that face into the winds.

Windstorms represent the most common type of severe weather. Often accompanying severe thunderstorms (convective windstorms), they can cause significant property and crop damage, threaten public safety and disrupt utilities and communications. Straight-line winds are generally any wind not associated with rotation and in rare cases can exceed 100 miles per hour (mph). The National Weather Service defines high winds as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration. Windstorms are often produced by super-cell thunderstorms or a line of thunderstorms that typically develop on hot and humid days. There are seven types of damaging winds:

- Straight-line winds—Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- Downdrafts—A small-scale column of air that rapidly sinks toward the ground.
- Downbursts—A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- Microbursts—A small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the

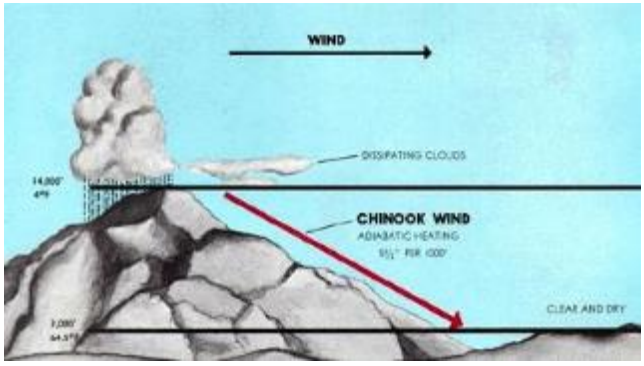
surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.

- Gust front—A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- Derecho—A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word "derecho" is of Spanish origin and means "straight ahead." Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- Bow Echo—A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

There are two additional types of winds common in some parts of El Paso County called Bora and Chinook winds:

- Along the Colorado Front Range, the foothill areas are susceptible to **Chinook winds** (Figure 4-32), which are caused by the large temperature variations between the northern and southern United States during the winter. Chinook winds are dry, warm winds that rush down the slopes of the eastern mountains. These winds plow down the slopes of the Front Range at speeds ranging from 60 to 100 mph. Chinook winds can down power lines, overturn cars, produce flying debris, and reduce visibility.

Figure 4-32: Illustration of Chinook Winds



- **Bora winds** are also common in some parts of El Paso County. A bora occurs when a strong low pressure system coupled with a high pressure system sends a cold wind through the western part of the State and down the slopes of the eastern mountains. High winds from the west or northwest into the adjacent plains can 100 miles per hour.

The Beaufort Scale below (Table 4-36) indicates commonly occurring conditions experienced at a range of wind speeds.

Table 4-36: Beaufort Wind Scale

Force	Wind Speed (knots)	Wind Speed (MPH)	Classification	Conditions on Land
0	Less than 1	Less than 1.15	Calm	Smoke rises vertically.
1	1-3	1.15 - 3.45	Light air	Smoke drifts and leaves rustle.
2	4-6	4.60 – 6.90	Light breeze	Wind felt on face.
3	7-10	8.06 – 11.51	Gentle breeze	Flags extended, leaves move.
4	11-16	12.66 – 18.41	Moderate breeze	Dust and small branches move.
5	17-21	19.65 – 24.17	Fresh breeze	Small trees begin to sway.
6	22-27	25.32 – 31.07	Strong breeze	Large branches move, wires whistle, umbrellas are difficult to control.
7	28-33	32.22 – 37.98	Near gale	Whole trees in motion, inconvenience in walking.
8	34-40	39.13 – 46.03	Gale	Difficult to walk against wind. Twigs and small branches blown off trees.
9	41-47	47.18 – 54.09	Strong gale	Minor structural damage may occur (shingles blown off roofs).
10	48-55	55.24 – 63.29	Storm	Trees uprooted, structural damage likely.
11	56-63	64.44 – 72.49	Violent storm	Widespread damage to structures.
12	64+	73.65+	Hurricane	Severe structural damage to buildings, wide spread devastation.

4.7.5.2 Previous Occurrences

More than 70 major wind events were reported in El Paso County between 2000 and July of 2019, a partial list is included in Table 4-37. These events had wind speeds ranging from 52 to 105 miles per hour. Areas within the County with damaging wind events are shown on Figure 4-33.

Table 4-37: Partial List of Significant Wind Events in El Paso County, 2000 - 2019

Date	Magnitude (mph)	Injuries/Fatalities	Property damages ($)
4/29/2000	**58**	**0**	**$10,000**
6/19/2000	64	0	0
7/7/2000	**52**	**0**	**$1,000**
7/7/2000	54	0	0
7/16/2000	60	0	0
8/21/2000	52	0	0
5/20/2001	52	0	0
5/20/2001	53	0	0
5/20/2001	53	0	0

Date	Magnitude (mph)	Injuries/Fatalities	Property damages ($)
5/28/2001	**105**	**7 Injuries**	**$400,000**
7/23/2001	65	0	0
5/21/2002	52	0	0
8/18/2002	**78**	**0**	**$30,000**
5/26/2003	63	0	0
6/20/2004	**60**	**0**	**$6,000**
8/4/2004	56	0	0
11/3/2005	**61**	**0**	**$200,000**
5/22/2006	**87**	**0**	**$1,250,000**
9/1/2006	70	0	0
8/11/2007	**61**	**0**	**$30,000**
8/23/2007	70	0	0
6/26/2009	**51**	**1 Injury**	**0**
5/24/2010	71	0	0
7/20/2010	73	0	0
4/3/2011	65	0	0
6/7/2012	65	0	0
6/4/2015	**61**	**0**	**$300**
6/12/2016	65	0	0
1/9/2017	**103**	**2 Fatalities**	**$20,000,000**
6/22/2017	**61**	**0**	**$44,000**
7/12/2017	69	0	0
4/17/2018	63	0	0
4/17/2018	62	0	0
7/20/2019	61	0	0
7/29/2019	65	0	0

Descriptions of several significant wind events are as follows:

- On **June 26, 2009,** a thunderstorm produced winds around 60 mph which ripped off large trees limbs and partially peeled off the roof of the El Paso County Courthouse in downtown Colorado Springs. A section of the El Paso County Courthouse roof was peeled off and a contractor worker was slightly injured. Power to 1,300 customers was lost for a short time and one contractor was slightly injured at the Courthouse.

- On **January 9, 2017**, a long-lasting high wind episode occurred across the eastern part of the area. Strong winds aloft, and a long-lasting mountain top stable layer generated widespread high winds and damage. Damage included downed power poles, causing numerous power outages to tens of thousands of customers, uprooted trees, roof damage, and numerous overturned semi-trailers in El Paso County. Winds gusted between 58 and 75 mph across many locations across the eastern mountains and Interstate 25 corridor. Gusts over 100 mph occurred on the southwest side of Colorado Springs, causing widespread damage. Two people were injured and then perished after being hit by flying debris in southwest Colorado Springs.

Figure 4-33: Areas Within the County with Damaging Wind Events, 1951 - 2018

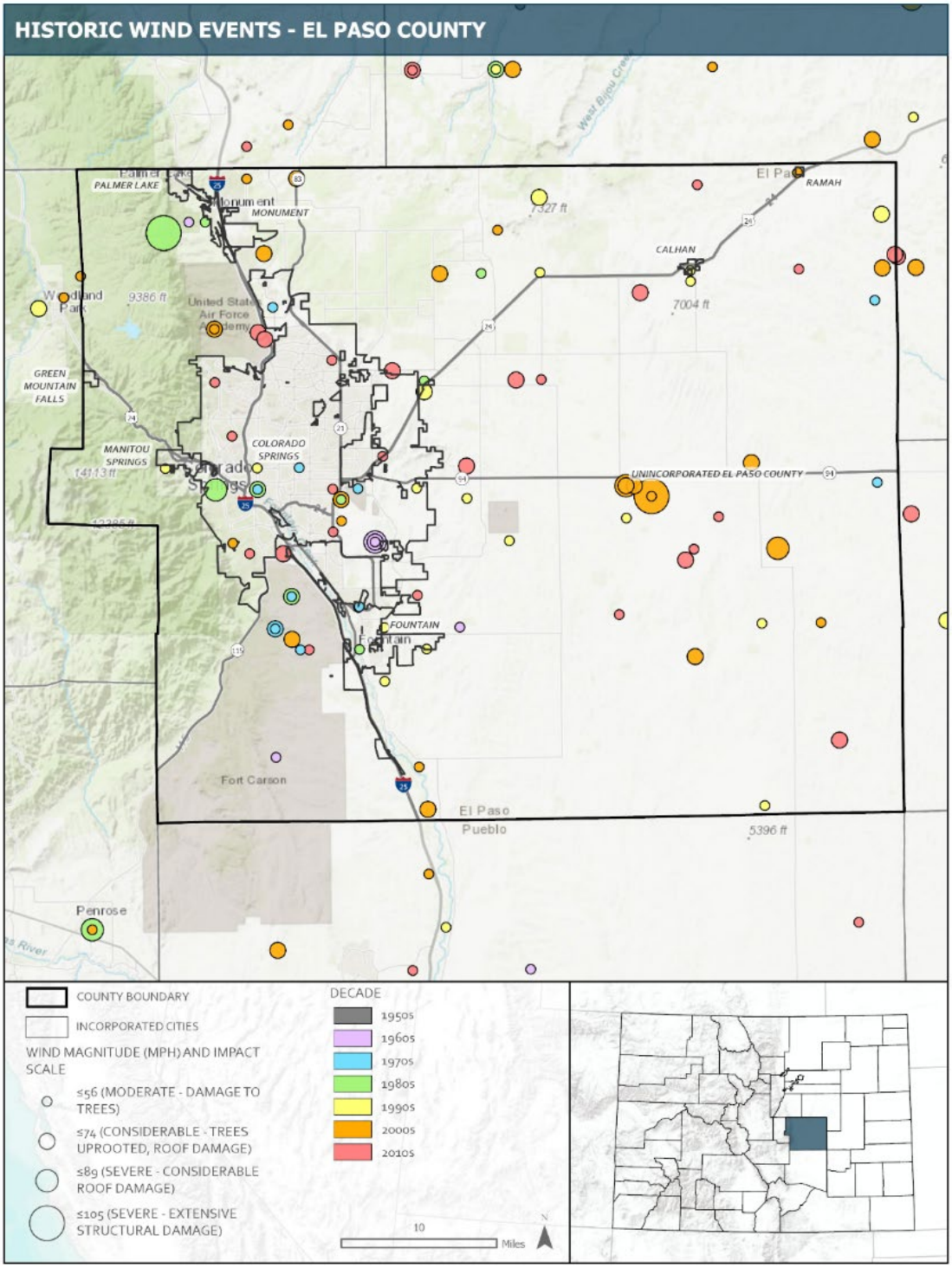
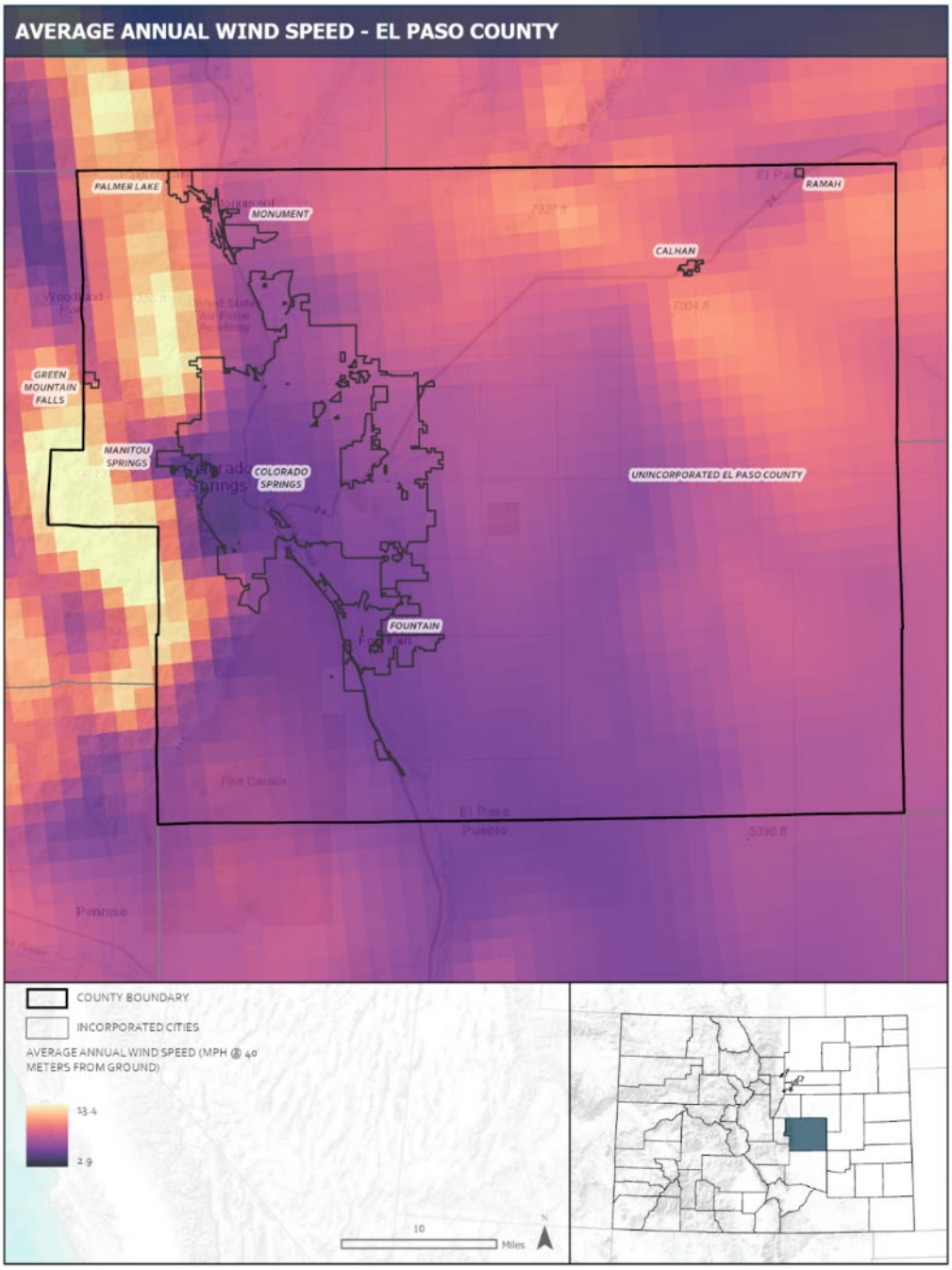


Figure 4-34 demonstrates the average annual wind speed at 40 meters from ground. It indicates higher wind speeds in the western part of the region in areas of higher elevation. Areas such as Palmer Lake,

Green Mountain Falls, Manitou Springs, and the western parts of El Paso County experience annual speeds averaging between 10 to 13 miles per hour.

Figure 4-34: Average annual wind speed at 40 meters from ground



4.7.5.3 Vulnerability

Table 4-38: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Environmental Damage	Overall Risk Score
Calhan	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Colorado Springs	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
El Paso County	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Fountain	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Green Mtn Falls	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Manitou Springs	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Monument	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Palmer Lake	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Ramah	Highly Likely	Limited	Significant	Maximum	Minor	Moderate
Regionwide	Highly Likely	Limited	Significant	Maximum	Minor	Moderate

Spatial Extent and Geographic Location

Windstorms could occur anywhere in El Paso County. Higher elevations could experience the most significant wind speeds, but these areas are generally not developed or populated. Wind events are most damaging to areas that are heavily wooded.

Probability of Future Occurrence

Highly Likely: Near 100 percent annual probability of a significant wind event. Based on over 70 events in 18 years, El Paso County experiences a significant high-wind event more than once per year on average; therefore, the frequency is considered highly likely.

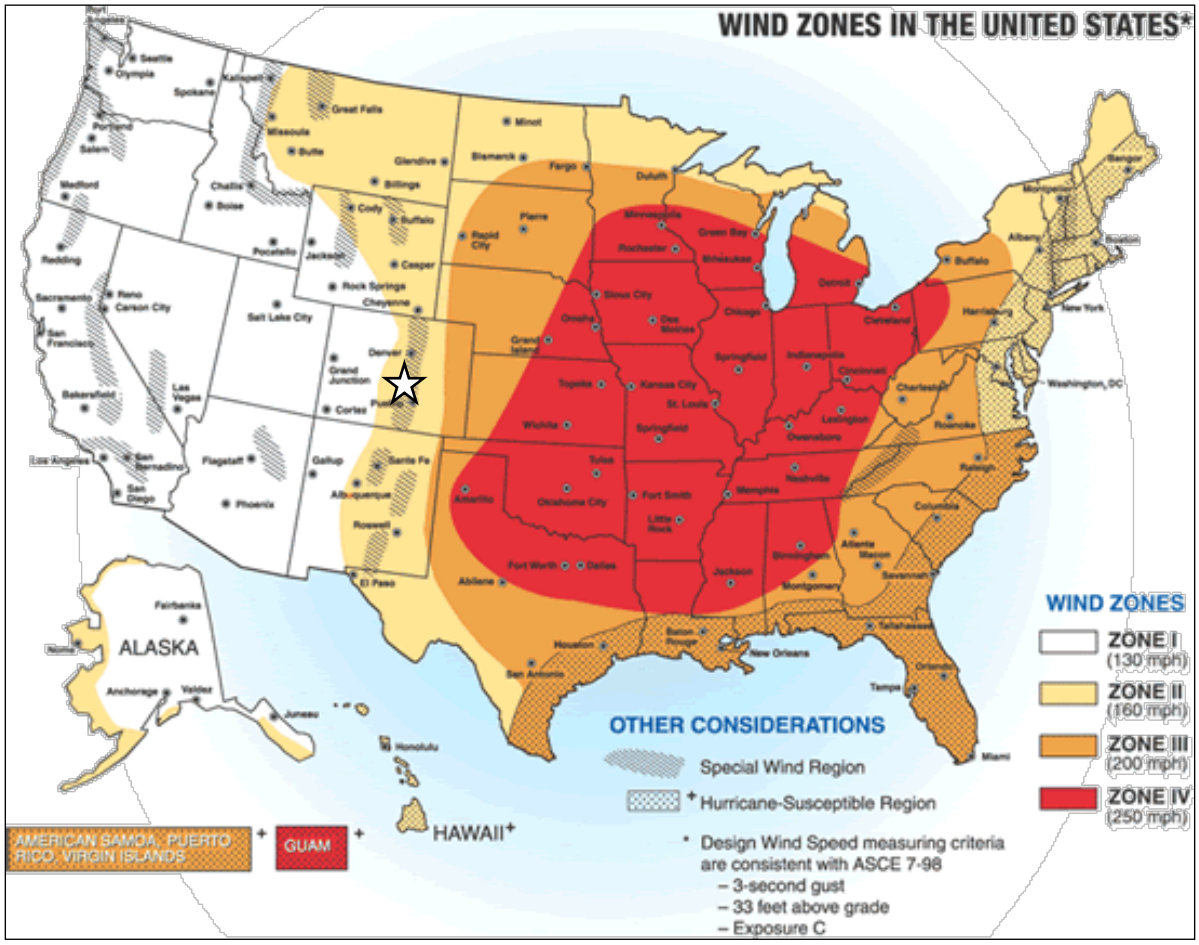
Magnitude / Severity

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

Windstorms in El Paso County are rarely life threatening, but do disrupt daily activities. Any structures and above ground utilities are vulnerable to damage caused by major wind events. Major wind events can cause downed trees and power lines, damage to structures and fences, and send dangerous debris into the air leading to more damage, injuries, and potential deaths. They can also increase the potential for other hazards, such as wildfire. Winter winds can also cause damage, close highways (blowing snow), and induce avalanches. Winds can also cause trees to fall, particularly those killed by pine beetles or wildfire, creating a hazard to property or those outdoors. Due to the higher elevations of El Paso County, the wind is less dense, and thus less damaging than comparable winds at sea level. According to wind zone information provided by FEMA (Figure 4-35), El Paso County is located in wind Zone II (160 mile per hour

maximum wind speeds). Portions of the County are also located in the Special Wind Region. These areas experience Chinook and Bora winds described above.

Figure 4-35: Wind Zones in the United States



Source: FEMA

Warning Time

Maximum: More than 24 hours. Meteorologists can often predict the likelihood of a high wind events. These events often accompany severe storms. However, meteorologists cannot predict the exact time of onset or severity of high wind events. Some events may come on more quickly and have only a few hours of warning time. The National Weather Service issues high wind advisories, high wind watches, and high wind warnings when hazardous conditions are expected.

Exposure and Losses

- **Property**

All of the buildings in the planning area are considered to be exposed to the severe wind hazard, but structures in poor condition or in particularly vulnerable locations (located on hilltops or exposed open areas) may risk the most damage. The frequency and degree of damage will depend on specific locations. Severe wind damage can include damage to siding, roof damage, and broken windows. Tractor-trailers may be overturned causing damage to their contents and other vehicles. Those structures that are located under or near overhead lines or near large trees may be damaged in the event of a collapse.

- **Population**

It can be assumed that the entire planning area is exposed to some extent to severe wind events. Certain areas are more exposed due to geographic location and local weather patterns. Populations living at higher elevations with large stands of trees or power lines may be more susceptible to wind damage and black out. Residents may be exposed to danger from flying debris, collapsed structures, and overturned vehicles during severe wind events.

Vulnerable populations are the elderly, low income, linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure during severe wind events and could suffer more secondary effects of the hazard.

- **Environment**

The environment is highly exposed to severe winds. Most damage results from falling trees or secondary hazards of severe winds, such as wildfires.

- **Critical Facilities and Infrastructure**

All critical facilities are likely exposed to risks associated with severe winds. Facilities on higher ground may be more greatly exposed to wind damage or damage from falling trees. The most common problems associated with these weather events are loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water, and sewer systems may not function.

Incapacity and loss of roads are the primary transportation failures resulting from severe winds, mostly associated with secondary hazards. Winds can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating population, and disrupting ingress and egress. Of particular concern are roads providing access to isolated areas and to the elderly. Prolonged windstorms can have negative economic impacts for an entire region. Severe windstorms and downed trees can create serious impacts on power and above-ground communication lines. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

4.7.5.4 Consequence Analysis

Wind Consequence Analysis

Category	Narrative
Hazard Description	Windstorms represent the most common type of severe weather. Often accompanying severe thunderstorms (convective windstorms), they can cause significant property and crop damage, threaten public safety and disrupt utilities and communications. Straight-line winds are generally any wind not associated with rotation and in rare cases can exceed 100 miles per hour (mph). The National Weather Service defines high winds as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration. Windstorms are often produced by super-cell thunderstorms or a line of thunderstorms that typically develop on hot and humid days.
Impact to Property, Facilities, and Infrastructure	Some instances of small amounts of property damage to structures and vehicles. All structures and above ground utilities are vulnerable to damage caused by major wind events. Major wind events can cause downed trees and power lines, damage to structures and fences, and send dangerous debris into the air leading to more damage, injuries, and potential deaths. Potential exposure and short-term impact to buildings, and utility and communications infrastructure. Downed trees can cause damage to property, infrastructure or facilities and may not be covered by insurance.
Impact on the Environment	Winds may damage residential and commercial structures, releasing hazardous materials or damaging natural gas lines, possibly leading to fire. Winds can result in damaged or the loss of trees. Additional debris in water can have an added impact on the environment. Crops may be damaged.
Impact on Responders	Fire and police, and emergency responders are called on to the impacted area to close roads, attend to the injured, and direct traffic away from the disaster area. The American Red Cross would be asked to provide shelters and attend to the injured. The Humane Society of the Pikes Peak Region would be asked to provide shelters for all animals. Members of the Voluntary Organizations Active in Disasters would be requested to assist with recovery. Infrastructure personnel can be considered responders due to responsibilities and may also be impacted by a high wind event.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	None or limited loss of facilities or infrastructure function or accessibility, or ability to provide services. Interruption of essential facilities and services for less than 24 hours. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from windstorms.
Impact on the Public	Minor injuries and illnesses. One of the largest dangers resulting from major windstorms is fallen trees or debris. Fallen branches can destroy automobiles, damage structures, and cause major injury or death to individuals. Motorists, air travelers, outdoor workers, outdoor recreationists are most at risk.

	If a high wind occurrence happens during a drought with extra dryness, it could cause visibility issues with blowing dust and sand. There is also a higher risk to life due to flying debris resulting from a high wind event.
Impact on the Economic Condition of the County	Should a severe windstorm occur within a heavily populated area, the damage [and impact on the economy] could be devastating.
Impact on the Public Confidence in Government	Characteristics of windstorms such as duration and speed of onset result in limited response and recovery functions for government beyond first responders. There are high expectations for rapid restoration of critical lifelines.

4.7.5.5 Secondary Hazards

The most significant secondary hazards associated with severe winds are falling and downed trees and downed power lines. Severe winds that cause power lines to fall can spark wildfires or can exacerbate and spread existing wildfires.

4.7.5.6 Future Condition Impacts

All future development will be affected by severe storms. The ability to withstand the impacts of severe winds lies in sound land use practices and consistent enforcement of codes and regulations for new construction.

FEMA Region VIII analyzed potential impacts to future conditions, including windstorms. Extent and magnitude are uncertain, but the frequency of summer events is likely to increase (Future Conditions Analysis, 2018).

4.7.5.7 Issues

Important issues associated with a severe wind events in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to severe weather events such as windstorms.
- Redundancy of power supply must be evaluated.
- The capacity for backup power generation is limited.
- Isolated population centers.
- The impacts of climate change on severe weather events are unknown.
- Severe winds have the potential to spark or exacerbate wildfires.

4.7.6 WINTER STORM

4.7.6.1 Definition and Extent

Winter storms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

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

DEFINITIONS

Winter Storm: A storm having significant snowfall, ice, and/or freezing rain; the quantity of precipitation varies by elevation.

Freezing Rain: The result of rain occurring when the temperature is below the freezing point. The rain freezes on impact, resulting in a layer of glaze ice up to an inch thick. In a severe ice storm, an evergreen tree 60 feet high and 30 feet wide can be burdened with up to six tons of ice, creating a threat to power and telephone lines and transportation routes.

Severe Local Storm: Small-scale atmospheric systems, including tornadoes, thunderstorms, windstorms, ice storms, and snowstorms. These storms may cause a great deal of destruction and even death, but their impact is generally confined to a small area. Typical impacts are on transportation infrastructure and utilities.

Blizzard: This event is produced by a combination of falling or blowing snow, and high winds, typically 35mph or more for a prolonged period of time. This combination can create potentially deadly travel conditions with impassable roads and restricted visibility

Wind chill: The combination of wind and temperature that serves as an estimate of how cold it actually feels to exposed human skin. Wind chill values below -19 are considered dangerous.

Extreme Cold

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

In 2001, the NWS implemented an updated wind chill temperature index (see Figure 4-36). This index describes the relative discomfort or danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 4-36. National Weather Service Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
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*

Source: National Weather Service, www.nws.noaa.gov/om/windchill/index.shtml

A wind chill watch is issued by the NWS when wind chill warning criteria are possible in the next 12 to 36 hours. A wind chill warning is issued for wind chills of at least negative 25 degrees on the plains and minus 35 degrees in the mountains and foothills.

4.7.6.2 Previous Occurrences

The National Climatic Storm Events Database lists over 270 severe winter weather events occurring from 2000 to 2019; however, many of those represent multiple storms during a single weather event. Severe winter weather events occurred in El Paso County on 132 separate dates during that 19-year time period,

as listed in Table 4-39. Additional narrative describing three of El Paso Counties more impactful winter weather events is provided after the table.

Table 4-39: El Paso County Winter weather Events, 2000-2019

Beginning Date	Event Type	Beginning Date	Event Type	Beginning Date	Event Type
1/3/2000	Winter Storm	12/20/2006	Blizzard	5/9/2013	Winter Storm
1/26/2000	Winter Storm	12/28/2006	Winter Storm	1/4/2014	Winter Weather
1/15/2001	Winter Storm	1/21/2007	Winter Weather	3/7/2014	Winter Storm
1/27/2001	Winter Storm	2/16/2007	Winter Weather	4/3/2014	Winter Storm
2/8/2001	Winter Storm	2/24/2007	Blizzard	5/11/2014	Winter Storm
1/30/2002	Heavy Snow	3/24/2007	Winter Weather	10/9/2014	Winter Storm
10/29/2002	Heavy Snow	4/6/2007	Winter Weather	1/21/2015	Winter Storm
11/1/2002	Heavy Snow	4/8/2007	Winter Weather	2/15/2015	Winter Storm
2/2/2003	Heavy Snow	4/12/2007	Winter Storm	2/21/2015	Winter Storm
2/5/2003	Heavy Snow	4/17/2007	Winter Weather	4/16/2015	Winter Storm
2/18/2003	Heavy Snow	4/24/2007	Winter Storm	4/26/2015	Winter Storm
3/1/2003	Heavy Snow	5/6/2007	Heavy Snow	5/9/2015	Winter Storm
3/17/2003	Winter Storm	5/23/2007	Winter Weather	5/18/2015	Winter Storm
4/23/2003	Heavy Snow	3/2/2008	Winter Storm	11/16/2015	Winter Storm
12/8/2003	Winter Storm	4/16/2008	Winter Storm	12/15/2015	Winter Storm
12/8/2003	Winter Storm	11/29/2008	Winter Storm	1/25/2016	Winter Weather
1/2/2004	Heavy Snow	1/3/2009	Winter Weather	2/1/2016	Winter Storm
1/20/2004	Heavy Snow	1/12/2009	Winter Weather	2/22/2016	Winter Storm
2/1/2004	Winter Storm	3/26/2009	Blizzard	3/23/2016	Winter Storm
2/19/2004	Heavy Snow	4/17/2009	Winter Storm	3/25/2016	Winter Storm
3/4/2004	Heavy Snow	10/28/2009	Winter Storm	4/15/2016	Winter Storm
4/2/2004	Winter Storm	3/19/2010	Winter Storm	4/28/2016	Winter Storm
4/22/2004	Winter Storm	3/23/2010	Winter Storm	5/16/2016	Winter Storm
4/25/2004	Heavy Snow	3/26/2010	Winter Storm	5/26/2016	Winter Storm
4/29/2004	Winter Storm	4/23/2010	Winter Storm	1/4/2017	Winter Storm
11/1/2004	Winter Storm	11/9/2010	Winter Weather	3/24/2017	Winter Storm
11/27/2004	Winter Storm	12/30/2010	Winter Storm	4/3/2017	Winter Storm
12/21/2004	Heavy Snow	1/31/2011	Winter Weather	4/28/2017	Winter Storm
1/28/2005	Winter Storm	2/3/2011	Winter Weather	5/17/2017	Winter Storm
3/20/2005	Heavy Snow	5/10/2011	Winter Storm	10/9/2017	Winter Weather
4/5/2005	Blizzard	10/7/2011	Winter Storm	1/21/2018	Winter Storm
4/10/2005	Blizzard	10/25/2011	Winter Storm	10/14/2018	Heavy Snow
10/10/2005	Winter Storm	11/1/2011	Winter Storm	10/30/2018	Winter Storm
11/14/2005	Heavy Snow	12/21/2011	Winter Storm	11/11/2018	Winter Weather
12/3/2005	Heavy Snow	2/2/2012	Winter Storm	1/11/2019	Winter Weather

Beginning Date	Event Type	Beginning Date	Event Type	Beginning Date	Event Type
1/16/2006	Heavy Snow	4/2/2012	Winter Storm	1/18/2019	Winter Weather
1/19/2006	Winter Storm	12/9/2012	Winter Weather	1/21/2019	Winter Storm
3/20/2006	Winter Storm	12/18/2012	Winter Storm	3/13/2019	Blizzard
9/22/2006	Heavy Snow	12/19/2012	Blizzard	4/10/2019	Winter Storm
10/17/2006	Winter Weather	2/20/2013	Winter Storm	5/8/2019	Winter Storm
10/25/2006	Winter Storm	2/23/2013	Winter Storm	5/20/2019	Winter Storm
10/26/2006	Blizzard	2/24/2013	Winter Storm	10/23/2019	Winter Storm
11/28/2006	Winter Storm	3/9/2013	Blizzard	11/25/2019	Winter Storm
12/19/2006	Winter Storm	5/8/2013	Winter Storm	12/28/2019	Winter Storm

April 2001 Blizzard

An intense low-pressure system over southeast Colorado produced blizzard conditions over northern El Paso County. Heavy snow of 6 to 18 inches combined with winds in excess of 80 mph to produce snow drifts up to 10 feet deep in some locations. Snowfall totaled 5 inches from Calhan to Ramah and 8 to 18 inches from Peyton to Monument and Black Forest. Hundreds of power poles were knocked down, leaving thousands of people without power for days in eastern El Paso County. Many motorists had to be rescued by El Paso County search and rescue and Fort Carson personnel. Around 200 people in two busses on I-25 had to be rescued. Property damage of $4 million was estimated.

April 2007 Winter Storm

An intense low-pressure system moving along the Colorado/New Mexico border generated significant snow accumulations over the region. The heavy wet snow combined with high winds, caused numerous power outages, downed power lines, and road closures. Some of the heavier snow amounts included 16 to 20 inches of snow in Monument. Snow drifts to around 4 feet were noted in northern El Paso County. Nearly 2 feet of snow covered Black Forest. In El Paso County, over 200 people were stranded, including 60 students who were on a bus. Thousands of people in eastern El Paso County were without power, some for several weeks. Hundreds of electrical transmission lines were downed. Property damage of $250,000 was estimated.

Abandoned Cars on Baptist Road in El Paso County, March 13, 2019

Source: Colorado Springs Gazette

March 2019 Bomb Cyclone

On March 13, 2019, an extremely powerful low-pressure system developed over

southern Colorado, setting a record for the lowest pressure ever recorded in the state. The system officially met the criteria of a "Bomb Cyclone", in which barometric pressure readings dropped in excess of 24 mb over a 24-hour period. The result was a widespread blizzard from Colorado Springs to the Eastern Plains and dropping feet of snow over the mountains. Some of the higher reported snow totals over El Paso county included six to nine inches of wind-driven snow near Falcon and the Air Force Academy, while fourteen to sixteen inches of wind-driven snow impacted the communities of Black Forest, Woodland Park and Monument respectively. The highest wind gusts measured 80 to near 100 mph, with the Colorado Springs airport recording a record gust of 96 mph.

Nearly 1,400 flights at the Denver International Airport were canceled and 5,000 passengers spent the night at the airport. All major highways and interstates were closed outside of the Denver area, including I-25 to Colorado Springs. Multiple car accidents occurred, and numerous travelers were stranded in cars. An estimated 1,500 motorists were stranded in northern El Paso County alone and the National Guard conducted more than 100 rescue operations. At one point, 445,000 customers were without power in the state. One direct fatality and 2 indirect fatalities in El Paso County occurred as a result of this intense storm system.

4.7.6.3 Vulnerability

Winter storms in the Pikes Peak Region can cause widespread impacts. The greatest threat is to public safety on major roads and highways. Power outages caused by snow, ice, and wind accompanied by cold temperatures, create additional needs for shelter. Other issues caused by winter storms can be related to school closures, business closures, road closures, snow removal, and maintaining critical services like emergency services, food providers, and banks.

Table 4-40: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Weighted Risk Score
Calhan	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Colorado Springs	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
El Paso County	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Fountain	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Green Mtn Falls	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Manitou Springs	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Monument	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Palmer Lake	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Ramah	Highly Likely	Critical	Significant	Maximum	Minor	Moderate
Regionwide	Highly Likely	Critical	Significant	Maximum	Minor	Moderate

Spatial Extent and Geographic Location

The entire County is susceptible to severe winter storms. From 1948 to 2016, as recorded at the Colorado Springs MUNI AP weather station, the coldest month on average is January, with an average minimum

temperature of 16.6 degrees Fahrenheit. The average annual snowfall is 39 inches and the number of days with a maximum temperature below 32 degrees Fahrenheit is 22 days. The highest annual snowfall was 89.4 inches during the winter of 1956-1957, which included 42.7 inches during April 1957. The coldest temperature on record was -27 degrees Fahrenheit on February 1, 1951.

Probability of Future Occurrence

Highly Likely: Near 100 percent annual probability. Severe winter weather events occurred in El Paso County on 132 separate dates during a 19-year time period. This makes the average probability of a severe winter storm in El Paso County approximately six to seven events per year.

Seventy six percent of El Paso County falls within the Koeppen Climate Zone of cold semi-arid. Although the probability of future occurrence of severe winter storms remains high, it is projected that the number of extreme cold events in the cold semi-arid climate zone will decline from approximately 185 to 95 days annually by the end of the 21st century, a difference of up to 60 days compared to historic levels.

Magnitude / Severity

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

Heavy snow can immobilize a region by stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and tear down trees and power lines. Loss of power affects homes, businesses, and water, sewer, and other services operated by electric pumps. The cost of snow removal, damage repair, and business losses can be significant.

Heavy accumulations of ice and or strong winds can bring down trees, power lines, telephone poles and lines, and communication towers, causing communication disruptions that can last for days or weeks. Blowing snow can severely reduce visibility. Serious vehicle accidents can result with injuries and deaths. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening; infants and the elderly are most at risk.

In rural parts of El Paso County, homes and ranches may be isolated for days, and unprotected livestock may be lost.

Warning Time

Maximum: More than 24 hours. Meteorologists can often predict the likelihood of a severe winter storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time.

Exposure and Losses

- **Property**

There are 227,356 buildings within the planning area. All of these buildings are considered to be exposed to severe winter weather, but structures in poor condition or in particularly vulnerable locations (located on hilltops or exposed open areas) may risk the most damage. Structures that are located under or near overhead lines or near large trees may be vulnerable to falling ice or may be damaged in the event of a collapse. The frequency and degree of damage will depend on specific locations.

Loss estimations for the severe winter weather hazard are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent, 50 percent, and 100 percent of the assessed value of exposed structures. This allows emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 4-41 lists the loss estimates.

Table 4-41: Loss Estimates for the General Building Stock for Jurisdictions that have an Exposure to Severe Winter Weather

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Estimated Loss Potential			
			10% Damage	30% Damage	50% Damage	100% Damage
Calhan	511	100%	$5,845,421	$17,536,263	$29,227,106	$58,454,211
Colorado Springs	137,504	100%	$4,831,347,170	$14,494,041,511	$24,156,735,851	$48,313,471,703
El Paso County	74,432	100%	$1,830,048,987	$5,490,146,961	$9,150,244,935	$18,300,489,870
Fountain	8,677	100%	$203,673,779	$611,021,338	$1,018,368,896	$2,036,737,793
Green Mtn Falls	377	100%	$8,072,542	$24,217,626	$40,362,711	$80,725,421
Manitou Springs	2,134	100%	$65,589,223	$196,767,670	$327,946,116	$655,892,232
Monument	2,373	100%	$93,071,660	$279,214,981	$465,358,302	$930,716,603
Palmer Lake	1,257	100%	$32,015,850	$96,047,550	$160,079,250	$320,158,500
Ramah	91	100%	$525,105	$1,575,314	$2,625,524	$5,251,048
Regionwide	**227,356**	**100%**	**$7,070,189,738**	**$21,210,569,214**	**$35,350,948,690**	**$70,701,897,380**

➢ Population

It can be assumed that the entire planning area is exposed to some extent to severe winter weather events. Certain areas are more exposed because of geographic location and local weather patterns. Vulnerable populations are the elderly, low income, linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure during severe winter weather events and could suffer more secondary effects of the hazard.

➢ Environment

The environment is highly exposed to severe weather events. Natural habitats such as streams and trees risk major damage and destruction. Flooding events caused by snowmelt can produce river channel migration or damage riparian habitat.

➢ Critical Facilities and Infrastructure

All critical facilities are likely exposed to severe winter weather. The most common problems associated with this hazard are utility losses. Downed power lines can cause blackouts, leaving large areas isolated. Telephone, water, and sewer systems may not function. Roads may become impassable because of ice or snow.

Incapacity and loss of roads are the primary transportation failures resulting from severe winter weather. Snowstorms can significantly impact the transportation system and the availability of public safety services. Of particular concern are roads providing access to isolated areas and to the elderly. Prolonged obstruction of major routes can disrupt the shipment of goods and other commerce. Large, prolonged storms can have negative economic impacts for an entire region.

Severe windstorms, downed trees, and ice can create serious impacts on power and aboveground communication lines. Freezing of power and communication lines can cause them to break, disrupting electricity and communication. Loss of electricity and telephone connection would leave certain populations isolated because residents would be unable to call for assistance.

4.7.6.4 Consequence Analysis

Winter Storm Consequence Analysis	
Category	**Narrative**
Hazard Description	Heavy snow can immobilize a region by stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and tear down trees and power lines. Loss of power affects homes, businesses, and water, sewer, and other services operated by electric pumps. The cost of snow removal, damage repair, and business losses can be significant.
Impact to Property, Facilities, and Infrastructure	Major or long-term property damage that threatens structural stability. Winter storms affect the entire planning area, including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be other costs associated with lost time, maintenance costs, and contents within structures. Heavy accumulations of ice, wet snow or strong winds can bring down trees, power lines, telephone poles and lines, and communication towers, causing communication disruptions that can last for days or weeks.
Impact on the Environment	The environmental impacts of a severe winter weather event are associated with the heavy snow and/or ice accumulations that can bring down vegetation and tree limbs. The rapid snowmelt may lead to flood events causing further environmental

	impacts.
Impact on Responders	Heavy snow can immobilize a region by stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Delayed response to emergency's due to closers. No services (food, gas, etc.,) for responders due to closures. Exposure exists to personnel performing routine duties when event occurs; storm-related duties are primarily post-event, however unsafe structural or environmental conditions may persist during the response period. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by blocked roadways.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Interruption of essential facilities and services for 24-72 hours. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from winter storms.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses**.** Winter storms in the Pikes Peak region cause widespread impacts. The greatest threat is to public safety on major roads and highways. Possible delays in response, delivery of medications/surgical equipment with road closures. Power outages caused by snow, ice, and wind accompanied by cold temperatures, create additional needs for shelter. Blowing snow can severely reduce visibility. Serious vehicle accidents can result with injuries and deaths. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening; infants and the elderly are most at risk. Stranded motorist would be at higher risk until first responders can move them to a safer location.
Impact on the Economic Condition of the County	Issues caused by winter storms can be related to school closures, business closures, road closures, snow removal, and maintaining critical services like emergency services, food providers, and banks.
Impact on the Public Confidence in Government	The public's confidence is highly dependent on the public's perception on how well response and recovery are handled during and after an event. A response that either shows or gives the impression the County is prepared and responsive to the public's needs and that it manages a recovery to get its services back to full operational capabilities and damage repaired in a timely manner will maintain or enhance the County's reputation.

4.7.6.5 Secondary Hazards

The most significant secondary hazards associated with severe local storms are falling and downed trees, landslides, and downed power lines. Rapidly melting snow combined with heavy rain can overwhelm both natural and man-made drainage systems, causing overflow and property destruction. Landslides can occur when the soil on slopes becomes oversaturated and fails.

4.7.6.6 Future Condition Impacts

All future development will be affected by severe storms. The ability to withstand the impacts of winter storms lies in sound land use practices and consistent enforcement of codes and regulations for new construction. Area planning departments have adopted the International Building Code. This code is equipped to deal with the impacts of severe weather events. Land use policies identified in general plans within the planning area also address many of the secondary impacts (flood and landslide) of the severe weather hazard.

Climate change presents a significant challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. Historical data shows that the probability for severe weather events increases in a warmer climate (see Figure 4-21). The changing hydrograph caused by climate change could have a significant impact on the intensity, duration and frequency of storm events. All of these impacts could have significant economic consequences.

4.7.6.7 Issues

Important issues associated with a winter storm in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to severe weather events such as windstorms or snowstorms.
- Redundancy of power supply must be evaluated.
- The capacity for backup power generation is limited.
- The high altitudes and rugged terrain in the planning area exacerbates emergency situations caused by winter storm events.
- Future efforts should be made to identify populations at risk and determine special needs during winter storm events.

4.8 AVALANCHE

4.8.1.1 Definition and Extent

According to the US National Weather Service, an avalanche is a rapid flow of snow down a hill or mountainside. Given the right conditions, avalanches can happen on any steep slope; however, certain times of the year and types of locations are naturally more dangerous.

DEFINITIONS

Avalanche: Any mass of loosened snow or ice and/or earth that suddenly and rapidly breaks loose from a snowfield and slides down a mountain slope, often growing and accumulating additional material as it descends.

An avalanche occurs when the stress (from gravity) trying to pull the snow downhill exceeds the strength (from bonds between snow grains) of the snow cover. There are four ingredients of an avalanche: steep slope, snow cover, weak layer in the snow cover, and a trigger. About 98% of all avalanches occur on slopes of 25-50 degrees. Earthquakes during the winter months could also trigger avalanches, potentially affecting even lower angled slopes and having widespread impacts depending on the level of ground shaking. Avalanches release most often on slopes above timberline that face away from prevailing winds (leeward slopes collect snow blowing from the windward sides of ridges.) Avalanches can run, however, on small slopes well below timberline, such as gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to steep slopes and prevent avalanches from starting; however, avalanches can release and travel through a moderately dense forest.

The common factors contributing to the avalanche hazard are old snow depth, old snow surface, new snow depth, new snow type, density, snowfall intensity, precipitation intensity, settlement, wind direction and speed, temperature, and subsurface snow crystal structure.

A number of weather and terrain factors determine avalanche severity and danger:

Weather:

- Storms—A large percentage of all snow avalanches occur during and shortly after storms.
- Rate of snowfall—Snow falling at a rate of 1 inch or more per hour rapidly increases avalanche danger.
- Temperature—Storms starting with low temperatures and dry snow, followed by rising temperatures and wetter snow, are more likely to cause avalanches than storms that start warm and then cool with snowfall.
- Wet snow—Rainstorms or spring weather with warm, moist winds and cloudy nights can warm the snow cover, resulting in wet snow avalanches. Wet snow avalanches are more likely on sun-exposed terrain (south-facing slopes) and under exposed rocks or cliffs.

Terrain:

- Ground cover—Large rocks, trees and heavy shrubs help anchor snow.
- Slope profile—Dangerous slab avalanches are more likely to occur on convex slopes.

- Slope aspect—Leeward slopes are dangerous because windblown snow adds depth and creates dense slabs. South-facing slopes are more dangerous in the springtime.
- Slope steepness—Snow avalanches are most common on slopes of 30 to 45 degrees.

Avalanches occur regularly in the backcountry and are not a problem until human activities and land uses are affected adversely by the avalanches. Possible conflicting land uses between humans and avalanches include recreation, residential, transportation, and mining. Examples of this conflict include property damage, injury, deaths, and excessive maintenance costs (e.g., removal of debris from transportation corridors impacted by avalanches).

Avalanches are extremely destructive due to the great impact forces of the rapidly moving snow and debris and the burial of areas in the runout zone. Avalanches can reach speeds of up to 200 miles an hour and can exert forces great enough to destroy structures and uproot or snap off large trees. Avalanche paths consist of a starting zone, a track, and a runout zone. The runout zone is often an attractive setting for development. Structures not specifically designed to withstand the impacts are generally destroyed. Where avalanches cross highways, passing vehicles can be swept away and demolished, and their occupants killed. Snow avalanches also imperil cross-country skiers, downhill skiers, snowboarders, and snowmobilers. Several backcountry visitors perish each winter in Colorado. Residences planned or erected in avalanche run out zones may not qualify for financing or insurance.

Damages associated with impact pressure are shown in Table 4-42 below.

Table 4-42. Impact Pressure Damage

Impact Pressure (lbs/ft^2)	Potential Damage
40-80	Break windows
60-100	Push in doors, damage walls, roofs
200	Severely damage wood frame structures
400-600	Destroy wood-frame structures, break trees
1000-2000	Destroy mature forests
>6000	Move large boulders

Additionally, two distinct scales for measuring avalanche magnitude include the Relative Size Scale, or R-Scale, and the Destructive Size Scale, or D-Scale. These are both qualitative scales that are useful when communicating avalanche activity and reporting on events or analyzing historic events. While the scales provide some structure around reporting on avalanche magnitude, scoring along the scales are still subjective in nature and rely upon consistency between event observers to produce appropriate estimates of magnitude. R-Scale is a simple estimate of the size, based on volume, of an avalanche relative to the path within which it occurs. Scoring along the R-Scale looks like this:

Table 4-43. R-Scale Scoring

Score	Description
R1	Very small, relative to path
R2	Small, relative to path
R3	Medium, relative to path
R4	Large, relative to path
R5	Major/Maximum, relative to path

D-Scale is an assessment of the destructive potential of an avalanche. Half-sizes are sometimes reported within this scale, and the scale includes components for mass and path length associated with each score along the scale.

Table 4-44. D-Scale Scoring

Score	Description	Typical Mass	Typical Length
D1	Relatively harmless to people	< 10 Tons	10 meters
D2	Could bury, injure, or kill a person	100 Tons	100 meters
D3	Could bury and destroy a car, damage a truck, destroy a wood frame house, or break a few trees	1000 Tons	1,000 meters
D4	Could destroy a railway car, large truck, several buildings, or a substantial amount of forest	10,000 Tons	2,000 meters
D5	Could gouge the landscape- largest snow avalanche known.	100,000 Tons	3,000 meters

According to the Colorado Avalanche Information Center (CAIC), avalanches have killed more people in Colorado than any other natural hazard since 1950, with 287 deaths in all, and Colorado accounts for one-third of all avalanche deaths in the United States (Colorado Avalanche Information Center, no date).

4.8.1.2 Previous Occurrences

Although infrequent, avalanches do occur periodically in this region. Generally, avalanches in the County are relatively minor. There has only been one recorded death attributable to an avalanche in the County since 1950. The fatality occurred on the east face of Pike's Peak in April of 1995. In January 2007, Manitou Springs experienced an avalanche that spilled snow 15 feet deep onto a local highway leading to the top of Pikes Peak Mountain. The highway was closed for the winter months. There were no injuries or property damages caused by this avalanche. Other than these incidents, there has been no record of avalanches occurring in El Paso County in the last 10 years.

4.8.1.3 Vulnerability

Table 4-45: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Unlikely	NA	NA	NA	Negligible	Negligible
Colorado Springs	Unlikely	Minor	Minor	Minimal	Minor	Low
El Paso County	Occasional	Minor	Limited	Minimal	Minor	Low
Fountain	Unlikely	NA	NA	NA	Negligible	Negligible
Green Mtn Falls	Occasional	Minor	Limited	Minimal	Minor	Low
Manitou Springs	Unlikely	NA	NA	NA	Negligible	Negligible
Monument	Unlikely	NA	NA	NA	Negligible	Negligible
Palmer Lake	Unlikely	NA	NA	NA	Negligible	Negligible
Ramah	Unlikely	NA	NA	NA	Negligible	Negligible
Regionwide	Occasional	Minor	Limited	Minimal	Minor	Low

Spatial Extent and Geographic Location

There is no mapped avalanche risk zone information available for the Pikes Peak Region; however, a slope analysis was performed in order to identify areas that may potentially be at risk for an avalanche event. Figure 4-37 shows slopes in the County that are greater than 30 degrees at over 8,000 feet elevation. The greatest potential impact from an avalanche is to those mountain communities of Green Mountain Falls, Chipita Park, and Cascade as well as Highway 24, but avalanches are also a danger to snowmobilers, backcountry skiers and hikers. Table 4-46 reflects the acreage and percent of area at risk by jurisdiction, only jurisdictions with exposure are included.

Figure 4-37: Avalanche Potential and Critical Facility Impacts in El Paso County

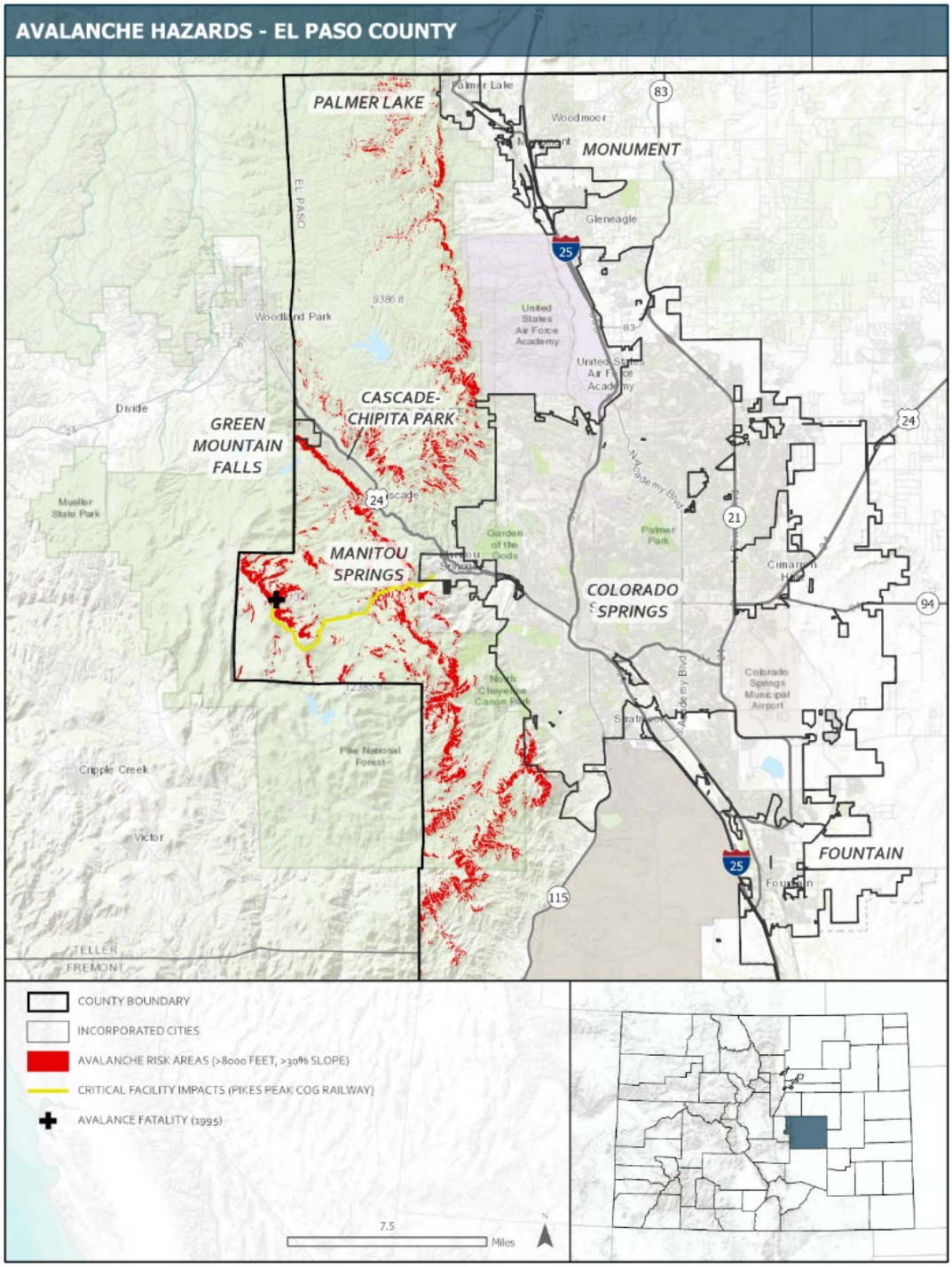
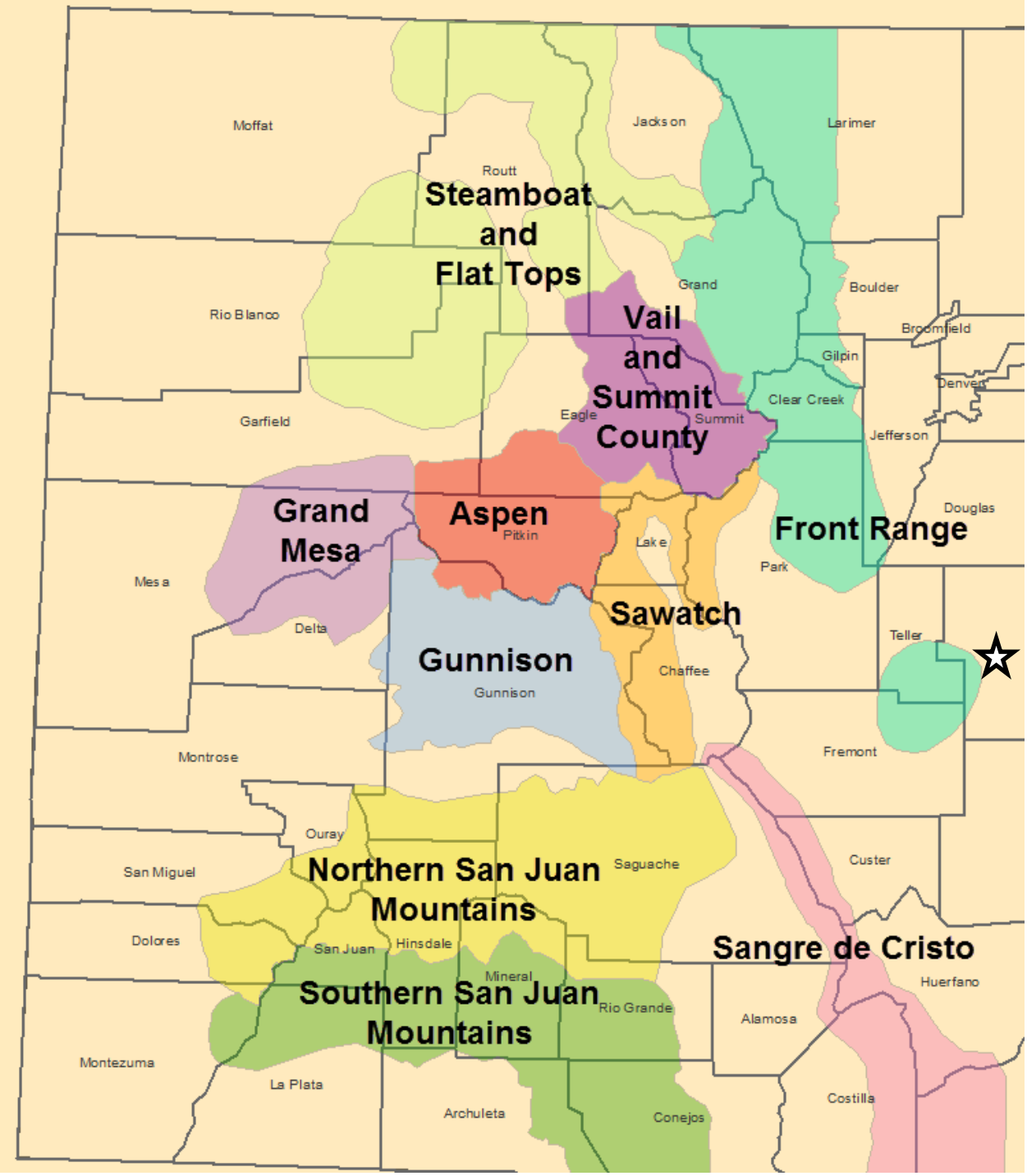


Table 4-46: Acreage and Percent of Area Exposed to Avalanche Hazard

Jurisdiction	Total Exposed Area (Acres)	Total Exposed Area (%)
Colorado Springs	211	0.2%
El Paso County	13,190	1.1%
Green Mountain Falls	44	9.5%
Regionwide	**13,445**	**1%**

The CAIC forecasts backcountry and mountain weather conditions for ten zones. The area surrounding Pikes Peak is part of the Front Range forecast zone. Figure 4-38 shows the CAIC forecast zones. This figure depicts the zone forecast areas for avalanche risk, but is not intended to show current risk as it constantly changes throughout the winter season. Rather, the intent of this figure is to show forecast zone boundaries as an indication of where avalanches tend to occur across the state.

Figure 4-38: Avalanche Forecast Zones in Colorado



Source: CAIC

Probability of Future Occurrence

Unlikely: less than 1 percent annual probability of a significant avalanche event (Calhan, Fountain, Manitou Springs, Monument, Palmer Lake, Ramah).

Occasional: 1 to 25 percent annual probability of a significant avalanche event (Colorado Springs, El Paso County, Green Mountain Falls).

The probability of a significant avalanche event occurring in the future is low and was considered as such by the local planning team and public, as reflected in the public input survey and feedback provided by the LPC at the kickoff meeting (see Appendix B).

Magnitude / Severity

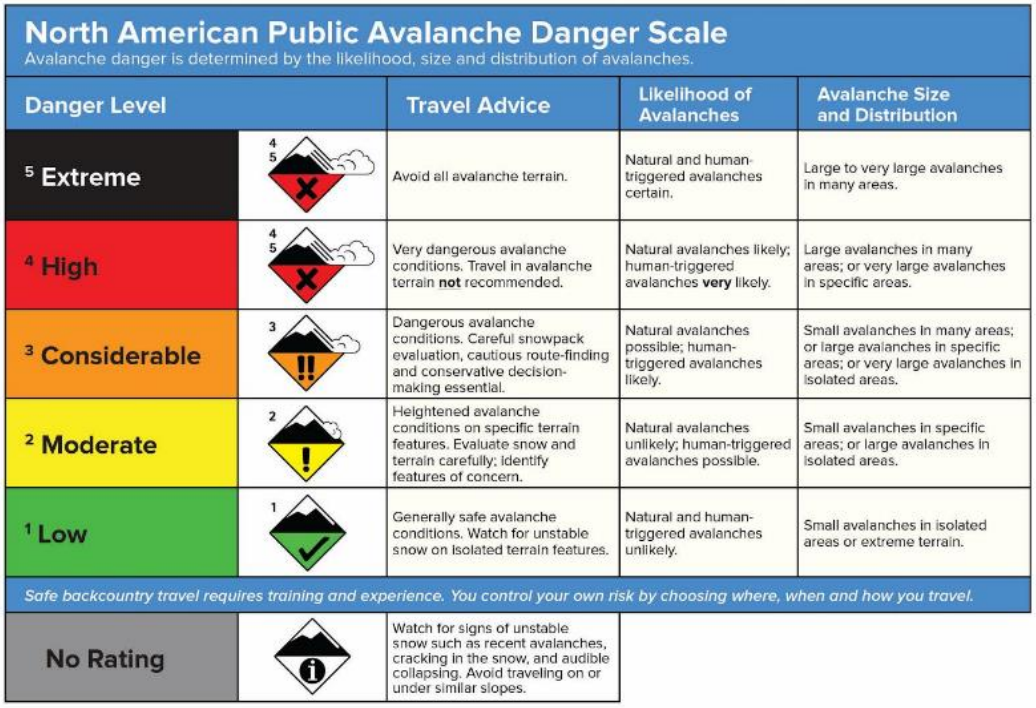
The severity of the avalanche hazard in the County is considered to be **minor** with minor injuries and illnesses; minimal property damage that does not threaten structural stability; and or interruption of essential facilities and services for less than 24 hours.

Warning Time

Minimal: Warning time is typically less than 6 hours. The time of an avalanche release depends on the condition of the snowpack; which can change rapidly during a day and particularly during rainfall. Although forecasts can provide information regarding when avalanches are more likely to occur, an avalanche can occur with little or no warning time.

CAIC issues watches and warnings to communicate avalanche danger levels to those recreating in backcountry areas by zone. The North American Danger Scale, which ranges from low to extreme danger is shown in Figure 4-39. The danger is a combination of the expected likelihood, size, and distribution of avalanches.

Figure 4-39. Avalanche Danger Scale



North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size and distribution of avalanches.

Danger Level		Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme	4 5	Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High	4 5	Very dangerous avalanche conditions. Travel in avalanche terrain **not** recommended.	Natural avalanches likely; human-triggered avalanches **very** likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 Considerable	3	Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 Moderate	2	Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 Low	1	Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.
Safe backcountry travel requires training and experience. You control your own risk by choosing where, when and how you travel.				
No Rating		Watch for signs of unstable snow such as recent avalanches, cracking in the snow, and audible collapsing. Avoid traveling on or under similar slopes.		

Source: Colorado Avalanche Information Center Website (https://avalanche.state.co.us/wpcontent/uploads/2017/07/DangerScale.jpg)

Exposure and Losses

➢ Property

Avalanche exposure in the County is minimal. Property and buildings within runout areas are exposed. Table 4-47 lists the loss estimates for the general building stock for jurisdictions that have an exposure to avalanche susceptibility areas. Although Green Mountain Falls is geographically exposed to avalanche susceptibility areas, no structures are located within exposure areas. Therefore, the town is omitted from the table below.

Table 4-47: Loss Estimates for the General Building Stock for Jurisdictions that have an Exposure to Avalanche Susceptibility Areas

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Estimated Loss Potential			
			10% Damage	30% Damage	50% Damage	100% Damage
Colorado Springs	3	0%	$10,689	$32,067	$53,445	$106,890
El Paso County	45	0.1%	$724,261	$2,172,782	$3,621,304	$7,242,607

Regionwide	**48**	**.02%**	**$734,950**	**$2,204,849**	**$3,674,749**	**$7,349,497**

➢ Population

No residents reside within avalanche susceptibility areas. The greatest potential impact from an avalanche is to wintertime back country visitors. In general, everything that is exposed to an avalanche event is vulnerable. As more people work, build, and recreate in mountain communities, there will be more people exposed to avalanche hazard areas. These individuals may have little experience with, caution regarding, or preparation for avalanche conditions. The increasing development of recreational sites in the mountains brings added exposure to the people using these sites and the access routes to them. The risk to human life is especially great at times of the year when rapid warming follows heavy, wet snowfall.

➢ Environment

Avalanches are a natural event, but they can negatively affect the environment. This includes trees located on steep slopes. A large avalanche can knock down many trees and kill the wildlife that lives in them. In spring, this loss of vegetation on the mountains may weaken the soil, causing landslides and mudflows. A large slab avalanche that releases from the ground may be more likely to carry a debris a farther distance in a burn scar. A burn scar would need to occur in a previously known avalanche path or at the prime angle for an avalanche to occur with this level of force. As with other avalanches, a weak base layer in the snowpack, followed by consolidated layers on top would need to occur.

➢ Critical Facilities and Infrastructure

It is unlikely that there are critical facilities exposed to avalanche hazards, although there may be some facilities exposed in mountain communities. There is a small amount of infrastructure that could be blocked by avalanches, such as Highway 24 and the Pikes Peak COG Railway, as shown in Figure 4-37 above. It should be noted that the Pikes Peak COG Railway is a visitor attraction and economic asset and is not considered critical infrastructure. Yet, it is important to call out as several segments of the rail line are within identified avalanche hazard areas.

4.8.1.4 Consequence Analysis

Avalanche Consequence Analysis	
Category	**Narrative**
Hazard Description	Although infrequent, avalanches do occur periodically in this region. Generally, avalanches in the County are relatively minor. Mountain communities are exposed to avalanche risk; however, the greatest exposure to the avalanche hazard is to persons participating in outdoor recreation in backcountry areas. Transportation routes, including Highway 24, are also exposed to avalanches.

Impact to Property, Facilities, and Infrastructure	Instances of personal property losses are infrequent yet occur on occasion. Known avalanche runs are typically void of development due to local land use regulations. Some events will impact private vehicles. Roadways can be blocked by avalanches but typically do not sustain significant damage. Communication and power infrastructure occasionally experiences short-term or minor impacts.
Impact on the Environment	Localized impact related to tree damage may be found in or around avalanche chutes. Removal or displacement of trees and rocks may cause secondary impacts such as landslides or rock falls as slope stability is impacted. There is potential for the short-term damming and sudden release of water if event intersects a waterway.
Impact on Responders	Some exposure exists to personnel performing routine duties on roadways and other areas that may be prone to events. Some responders may face risk of avalanches during response if entering avalanche prone areas; however, most avalanche-related duties are post-event where risk of occurrence has subsided.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Loss of facilities or infrastructure for the provision of government services is expected to be non-existent or negligible. Possible short-term accessibility issues for first responders performing routine duties or personnel reporting to work locations.
Impact on the Public	The greatest exposure to the avalanche hazard is to persons participating in outdoor recreation in backcountry areas. Highway maintenance crews and motorists are also at risk of avalanche near or on roadways.
Impact on the Economic Condition of the County	Possible short-term blockage of roadways that prevent travel and access to local businesses by residents, recreationists, and tourists. Due to limited exposure of property to this hazard, economic losses resulting from damage to buildings and personal property or associated downtime are anticipated to be limited.
Impact on the Public Confidence in Government	Characteristics of avalanches result in limited response and recovery functions for government beyond first responders. Monitoring programs typically mitigate potential large-scale events and road crews are typically swift in restoring service to blocked roadways.

4.8.1.5 Secondary Hazards

Avalanches can cause several types of secondary effects, such as blocking roads, which can isolate residents and businesses and delay commercial, public, and private transportation. This could result in economic losses for businesses. Other potential problems resulting from avalanches are power and communication failures. Avalanches also can damage rivers or streams, potentially harming water quality, fisheries, and spawning habitat.

4.8.1.6 Future Condition Impacts

Avalanche conditions are predicted by the snowpack conditions and slope. Given these parameters, slope and elevation conditions should be considered for development to avoid avalanches. However, they must also be considered in upslope areas where when avalanche may crown and flow into the development. It

is common that areas that are avalanche prone are not prime for development given the geographic challenges (slope) and the unfavorable climate.

The effects of climate change on avalanche frequency and magnitude are uncertain and will likely be dependent on local climate change impacts, such as changes in snow fall events and temperature series. Some studies have indicated that the types of avalanche events (wet or dry) may shift as a result of changes in snow cover (Martin et al., 2001). Avalanches, however, are not influenced by snow cover alone, but several interrelated factors including forest structure, surface energy balance, melt water routing, precipitation, air temperature, and wind (Teich et al., 2012, Eckert, 2009 and Lazar and Williams, 2008). Feedback loops affecting snow cover, forest structure, meteorological normals, and land use planning decisions are all likely to influence the future frequency and severity of impacts from avalanche events.

4.8.1.7 Issues

The significant issues of concern in the event of an avalanche are the threat to recreational users and property and the possibility of disruption of transportation networks. According to the Colorado Department of Transportation during the 2018-2019 winter there were 1,707 hours of road closures due to avalanche control, resulting in a total of 44,378 feet of snow covering the centerline of the roadway. There is no effective way to keep the public out of avalanche-prone recreational areas, even during times of highest risk. A coordinated effort is needed among state, county and local law enforcement, fire, emergency management, public works agencies and media to better provide winter snowpack and avalanche risk information to the public.

A national program to rate avalanche risk has been developed to standardize terminology and provide a common basis for recognizing and describing hazardous conditions. The avalanche danger scale relates degree of avalanche danger (low, moderate, considerable, high, extreme) to descriptors of avalanche probability and triggering mechanism, degree and distribution of avalanche hazard, and recommended action in back country. Avalanche danger scale information should be explained to the public and made available through appropriate county and local agencies and the media.

Measures that have been used in other jurisdictions to reduce avalanche threat include monitoring timber harvest practices in slide-prone areas to ensure that snow cover is stabilized as well as possible, and encouraging reforestation in areas near highways, buildings, power lines, and other improvements. The development of a standard avalanche report form, and the maintenance of a database of potential avalanche hazards likely to affect proposed developments in mountain wilderness areas, would be of significant value to permitting agencies.

4.9 GEOLOGIC

Geologic hazards originate from adverse geologic conditions that are a risk to human health and can cause property damage. Geologic hazards can occur abruptly or as a result of slow formation. For El Paso County and the participating jurisdictions, geologic hazards include:

- Earthquake
- Subsidence and Rockfall
- Landslide or Rockfall

4.9.1 EARTHQUAKE

4.9.1.1 Definition and Extent

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of people, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake (FEMA, 1997).

DEFINITIONS

Earthquake: The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth or a contact zone between tectonic plates.

Epicenter: The point on the earth's surface directly above the hypocenter of an earthquake. The location of an earthquake is commonly described by the geographic position of its epicenter and by its focal depth.

Fault: A fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other.

Liquefaction: Loosely packed, water-logged sediments losing their strength in response to strong shaking, causing

Often, the most dramatic evidence of an earthquake results from the vertical and/or horizontal displacement of the ground along a fault line. This displacement can sever transportation, energy, utility, and communications infrastructure potentially impacting numerous systems and persons. These ground displacements can also result in severe and complete damages to structures situated on top of the ground fault. However, most damage from earthquake events is the result of shaking. Shaking also produces several phenomena that can generate additional damage:

- Additional ground displacement
- Landslides and avalanches
- Liquefaction and subsidence
- Seismic Seiches

Shaking: During minor earthquake events, objects often fall from shelves and dishes rattle. In major events, large structures may be torn apart by the forces of the seismic waves. Structural damage is generally limited to older structures that are poorly maintained, poorly constructed, or improperly (or

not) designed for seismic events. Un-reinforced masonry buildings and wood frame homes not anchored to their foundations are typical victims of earthquake damage. Loose or poorly secured objects also pose a significant hazard when they are loosened or dropped by shaking. These "non-structural falling hazard" objects include bookcases, heavy wall hangings, and building facades. Home water heaters pose a special risk due to their tendency to start fires when they topple over and rupture gas lines. Crumbling chimneys may also be responsible for injuries and property damage. Dam and bridge failures are significant risks during stronger earthquake events, and due to the consequences of such failures, may result in considerable property damage and loss of life. In areas of severe seismic shaking hazard, shaking intensity levels of VII or higher can be experienced even on solid bedrock. In these areas, older buildings especially are at significant risk.

Ground Displacement: Ground displacement can also occur due to shaking, resulting in similar damages as mentioned previously.

Landslides and Avalanches: Even small earthquake events can cause landslides. Rock falls are common as unstable material on steep slopes is shaken loose, but significant landslides or even debris flows can be generated if conditions are ripe. Roads may be blocked by landslide activity, hampering response and recovery operations. Avalanches are also possible when there is enough snowpack.

Liquefaction and Subsidence: Soils may liquefy and/or subside when impacted by the seismic waves. Fill and previously saturated soils are especially at risk. The failure of the soils has the potential to cause widespread structural damage. The oscillation and failure of the soils may result in increased water flow and/or failure of wells as the subsurface flows are disrupted and sometimes permanently altered. Increased flows may be dramatic, resulting in geyser-like water spouts and/or flash floods. Similarly, septic systems may be damaged creating both inconvenience and health concerns.

Seiches: Seismic waves may rock an enclosed body of water (e.g., lake or reservoir), creating an oscillating wave referred to as a "seiche." Although not a common cause of damage, there is a potential for large, forceful waves like a tsunami ("tidal waves") to be generated on large reservoirs like Rampart Dam and Reservoir. These earthquake-generated waves could impact shoreline development and may have the potential to overtop, leading to downstream flash flooding.

The amount of energy released during an earthquake is usually expressed as a Richter magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking, typically the greatest cause of losses to structures during earthquakes, at any given location on the surface as felt by humans and defined in the Modified Mercalli Intensity Scale.

Table 4-48: Magnitude and Intensity Scales for Earthquakes

Magnitude and Intensity Comparison	
Richter Scale	**Maximum Modified Mercalli Intensity**
1.0 to 3.0	I
3.0 to 3.9	II to III
4.0 to 4.9	IV to V
5.0 to 5.9	VI to VII

6.0 to 6.9	VII to IX
7.0 and higher	VIII or higher
Defined Modified Mercalli Intensity Scale Rating	
I	Not felt except by a very few under especially favorable conditions
II	Felt only by a few persons at rest, especially on upper floors of buildings
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations like the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well -built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well -designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well -built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: USGS, online at http://earthquake.usgs.gov/learn/faq/?categoryID=2, accessed on February 6, 2010. 2016 updated link: http://earthquake.usgs.gov/learn/topics/mercalli.php

PGA is the effective Peak Ground Acceleration during the earthquake. It is equal to the maximum ground acceleration that occurred during the earthquake shaking at a location.

Earthquakes are extremely difficult to predict, and their occurrence rate is determined in one of two ways. If geologists can find evidence of distinct, datable earthquakes in the past, the number of these ruptures is used to define an occurrence rate. If evidence of ruptures is not available, geologists estimate fault slip rates from accumulated scarp heights and estimated date for the oldest movement on the scarp. Because a certain magnitude earthquake is likely to produce a displacement (slip) of a certain size, we can estimate the rate of occurrence of earthquakes of that magnitude.

Recurrence rates are different for different assumed magnitudes thought to be “characteristic” of that fault type. Generally, a smaller magnitude quake will produce a faster recurrence rate, and for moderate levels of ground motion, a higher hazard risk. Future earthquakes are assumed to be likely to occur where earthquakes have produced faults in the geologically recent past. Quaternary faults are faults that have slipped in the last 1.8 million years and it is widely accepted that they are the most likely source of future large earthquakes. For this reason, quaternary faults are used to make fault sources for future earthquake models.

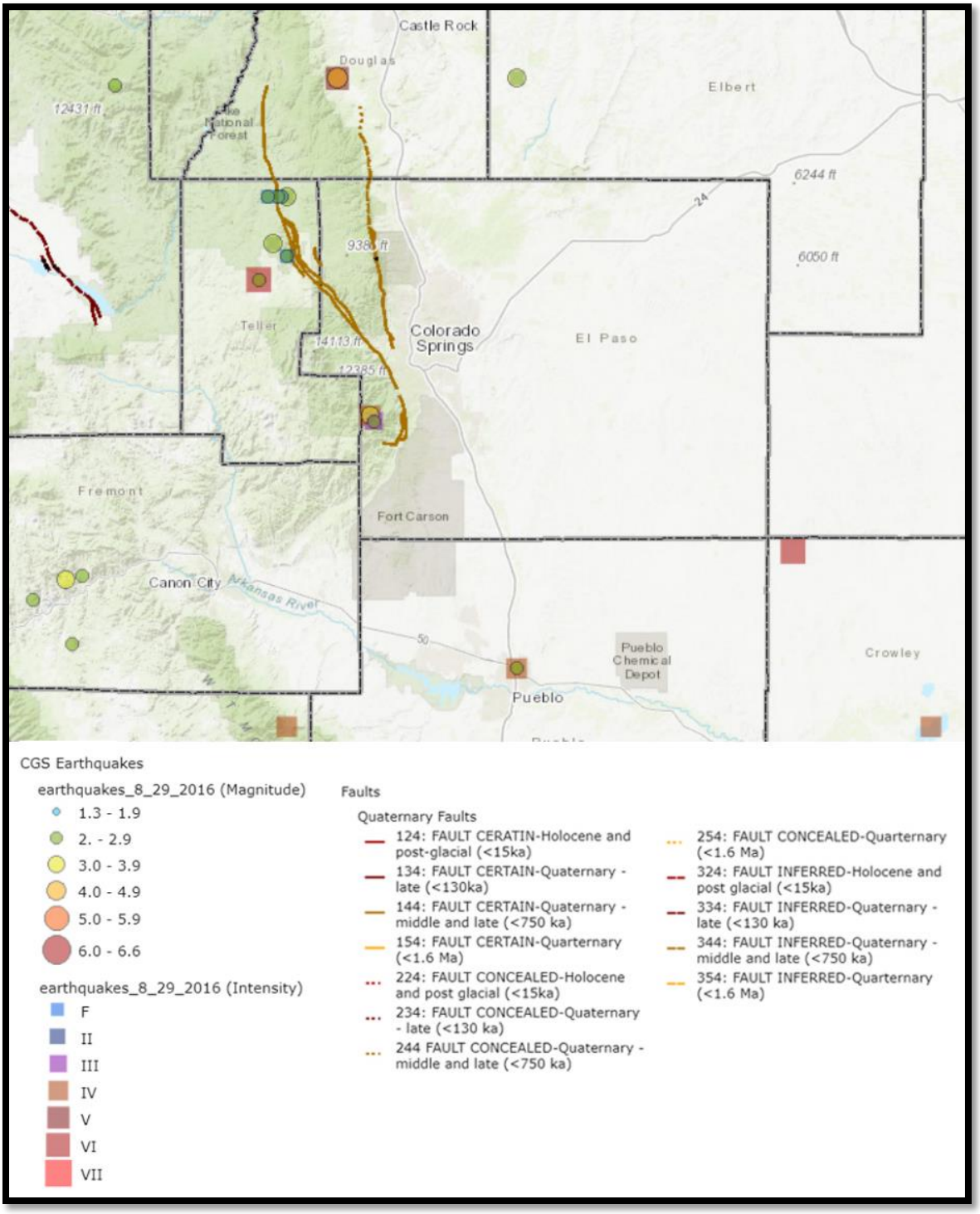
4.9.1.2 Previous Occurrences

Colorado has a relatively short period of historical records for earthquakes. An earthquake and fault map developed by the Colorado Geological Survey depicts the location of historical epicenters and potentially active faults in the state. Figure 4-40 shows the mapping for El Paso County and vicinity. It also shows that earthquakes have occurred in counties surrounding El Paso County. The Ute Pass Fault Zone runs approximately along State Highways 67 and 24 to the western edge of the Colorado Springs, and the smaller fault to the east of the Ute Pass Fault Zone is the Rampart Range Fault. The Rampart Range Fault begins near Larkspur and continues south towards Colorado Springs, ending near Colorado Highway 24. Both faults are classified as Quaternary. Any such earthquake that is strong enough and close enough to the county has the potential to have impacts inside El Paso County.

The map shows the following recorded earthquake events in El Paso County:

- **December 23, 1995** – Manitou Springs area, Magnitude 3.5
- **December 31, 1995** – Manitou Springs area, Magnitude 2.8

Figure 4-40: Earthquake History and Fault Map, Pikes Peak Region and Vicinity



Source: https://cgsarcimage.mines.edu/ON-001/ Accessed May 29, 2020

4.9.1.3 Vulnerability

Table 4-49: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Unlikely	Minor	Moderate	Minimal	Negligible	Low
Colorado Springs	Unlikely	Limited	Significant	Minimal	Minor	Moderate
El Paso County	Unlikely	Limited	Significant	Minimal	Minor	Moderate
Fountain	Unlikely	Minor	Moderate	Minimal	Negligible	Low
Green Mtn Falls	Unlikely	Critical	Significant	Minimal	Minor	Moderate
Manitou Springs	Unlikely	Critical	Significant	Minimal	Minor	Moderate
Monument	Unlikely	Critical	Significant	Minimal	Moderate	Moderate
Palmer Lake	Unlikely	Critical	Significant	Minimal	Moderate	Moderate
Ramah	Unlikely	Minor	Moderate	Minimal	Negligible	Low
Regionwide	Unlikely	Critical	Significant	Minimal	Minor	Moderate

Spatial Extent and Geographic Location

According to the CGS, Colorado is comprised of areas with low to moderate potential for damaging earthquakes. There are about 90 potentially active faults that have been identified in Colorado with documented movement within the last 1.6 million years. Figure 4-40 shows potentially active faults in the Pikes Peak region and surrounding vicinity.

Earthquakes are a regional hazard that would affect all areas of the Pikes Peak region with varying magnitude and severity.

Mapping that shows the impacts of these components was used to assess the risk of earthquakes within the planning area. While the impacts from each of these components can build upon each other during an earthquake event, the mapping looks at each component individually. Scenarios selected for this plan include a 500-year probabilistic event, a magnitude-6.0 event on the Rampart fault and a magnitude-6.0 event on the Ute Pass fault:

- 500 Year Probabilistic Scenario (see Figure 4-41) —This is a HAZUS-MH probabilistic-event scenario, which allows the user to generate estimates of damage and loss based on the seismic hazard for a specified return period.
- Rampart Fault Zone Scenario (see Figure 4-42 for regional scale map and Figure 4-43 for each participating jurisdiction)—A Magnitude 6.0 event with a shallow depth and epicenter 3.5 miles southwest of Monument. This is a HAZUS-MH arbitrary-event scenario, which is defined by the location of its epicenter and by its magnitude. The epicenter is defined by latitude and longitude. The user specifies the magnitude, depth, type, rupture orientation and length.

- Ute Pass Fault Zone Scenario (Figure 4-44 for regional scale map and Figure 4-45 for each participating jurisdiction)—A Magnitude 6.0 event with a shallow depth and epicenter in 1.5 miles southeast of Green Mountain Falls. This is a HAZUS-MH arbitrary-event scenario, which is defined by the location of its epicenter and by its magnitude. The epicenter is defined by latitude and longitude. The user specifies the magnitude, depth, type, rupture orientation and length.

Figure 4-41: 500 Year Probabilistic Scenario

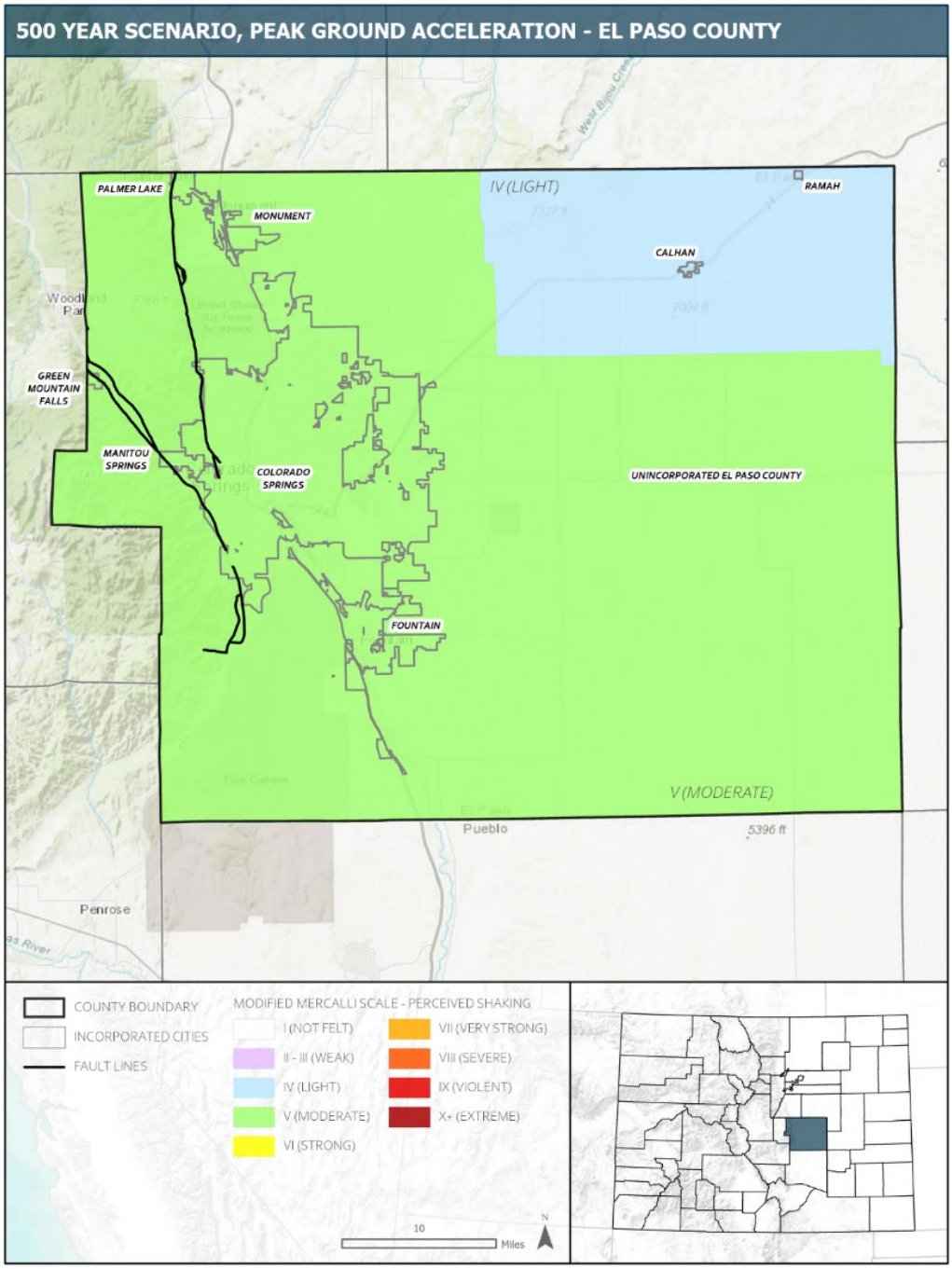


Figure 4-42: Rampart Fault Zone Scenario, Magnitude 6.0, Pikes Peak Region

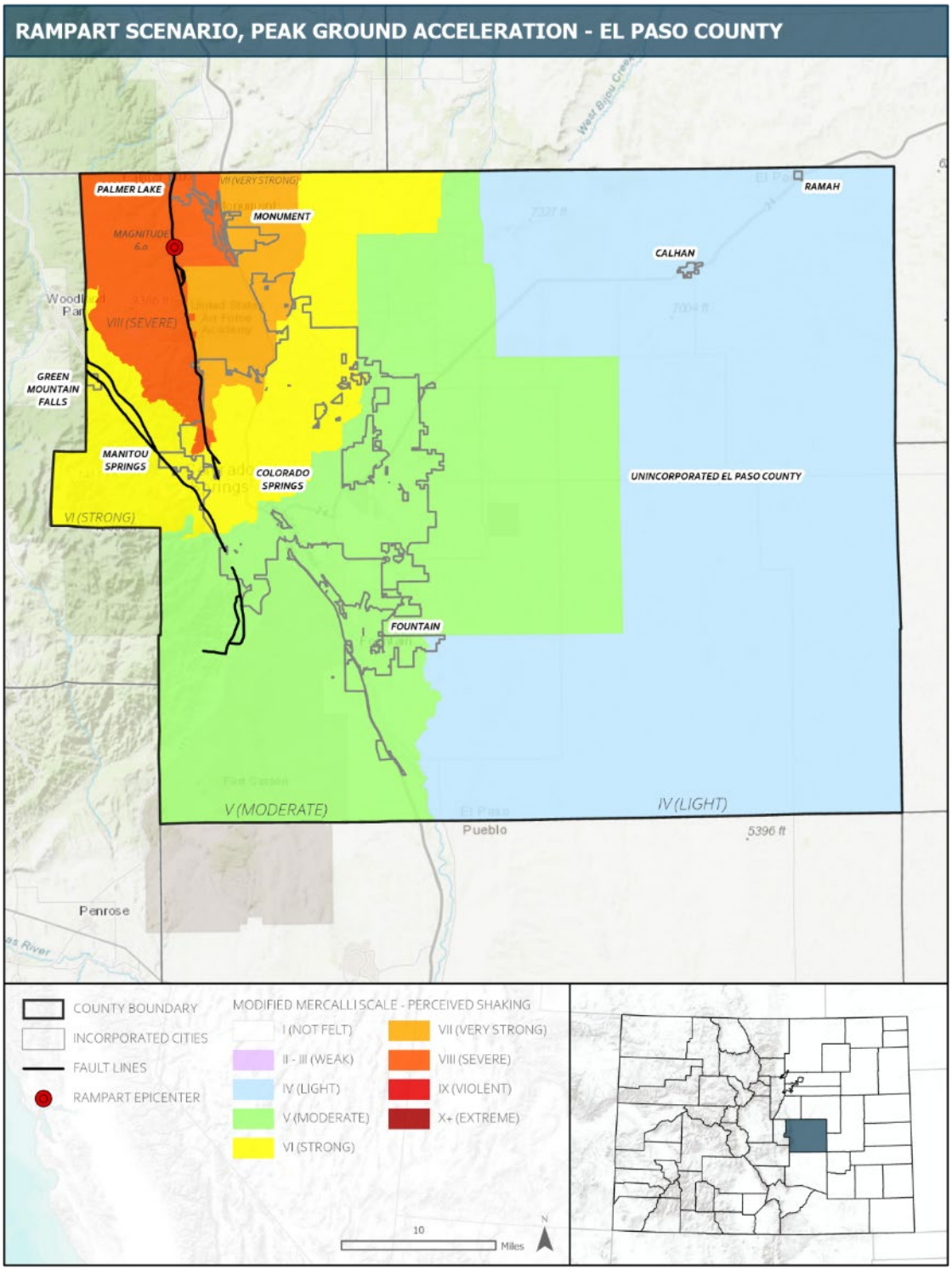


Figure 4-43: Rampart Fault Zone Scenario, Magnitude 6.0, Participating Jurisdictions

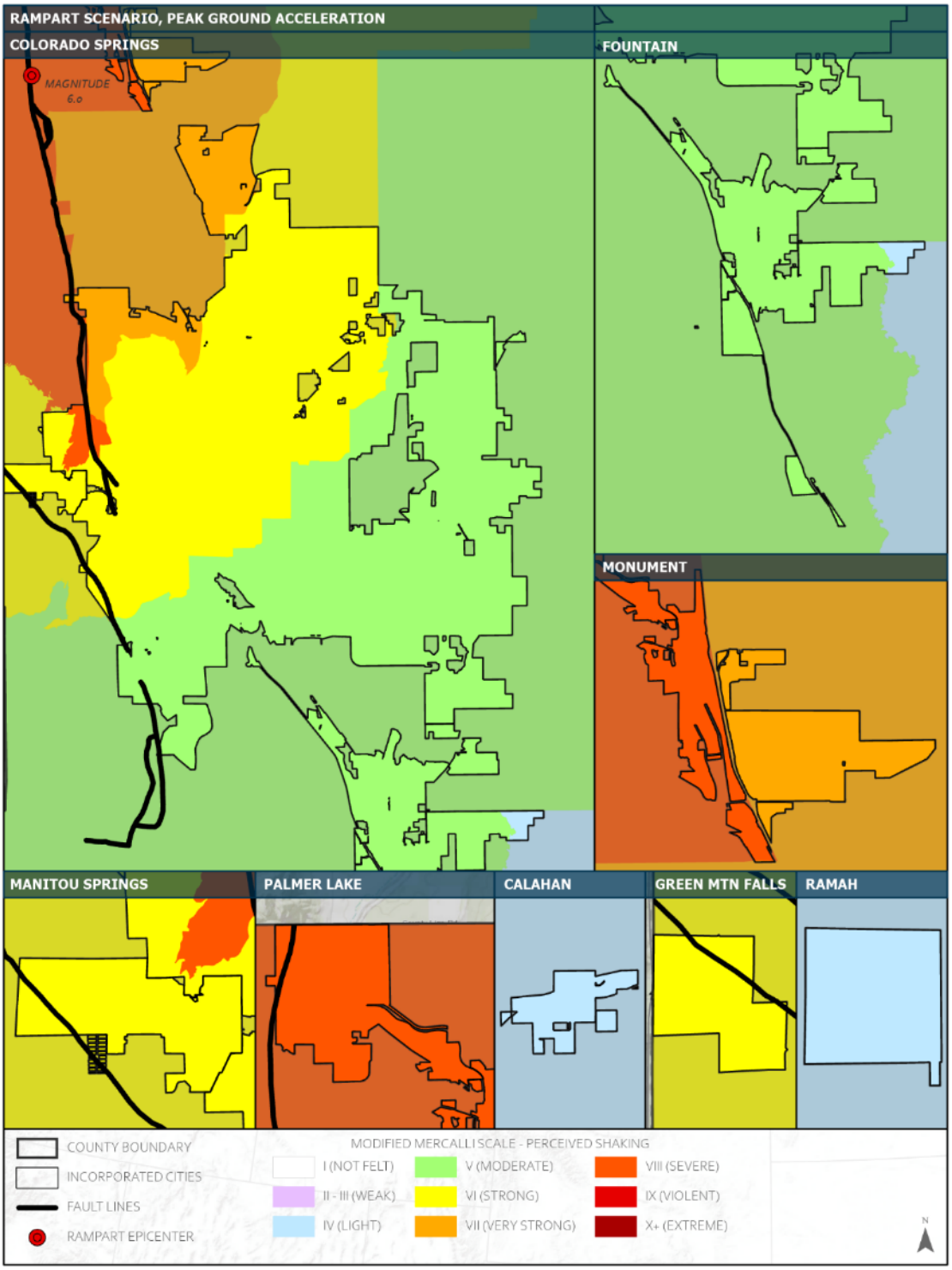


Figure 4-44: Ute Pass Fault Zone Scenario, Magnitude 6.0, Pikes Peak Region

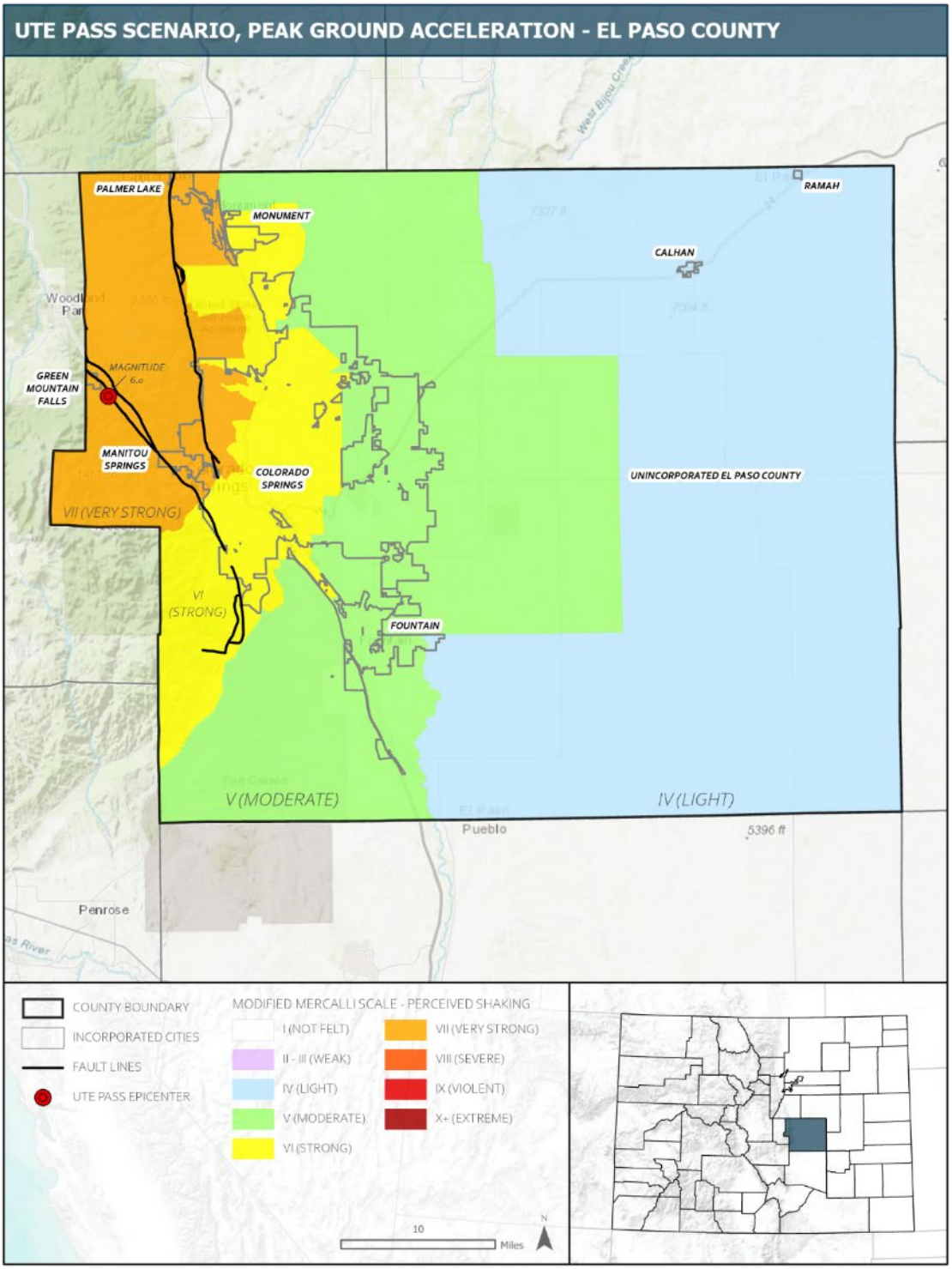
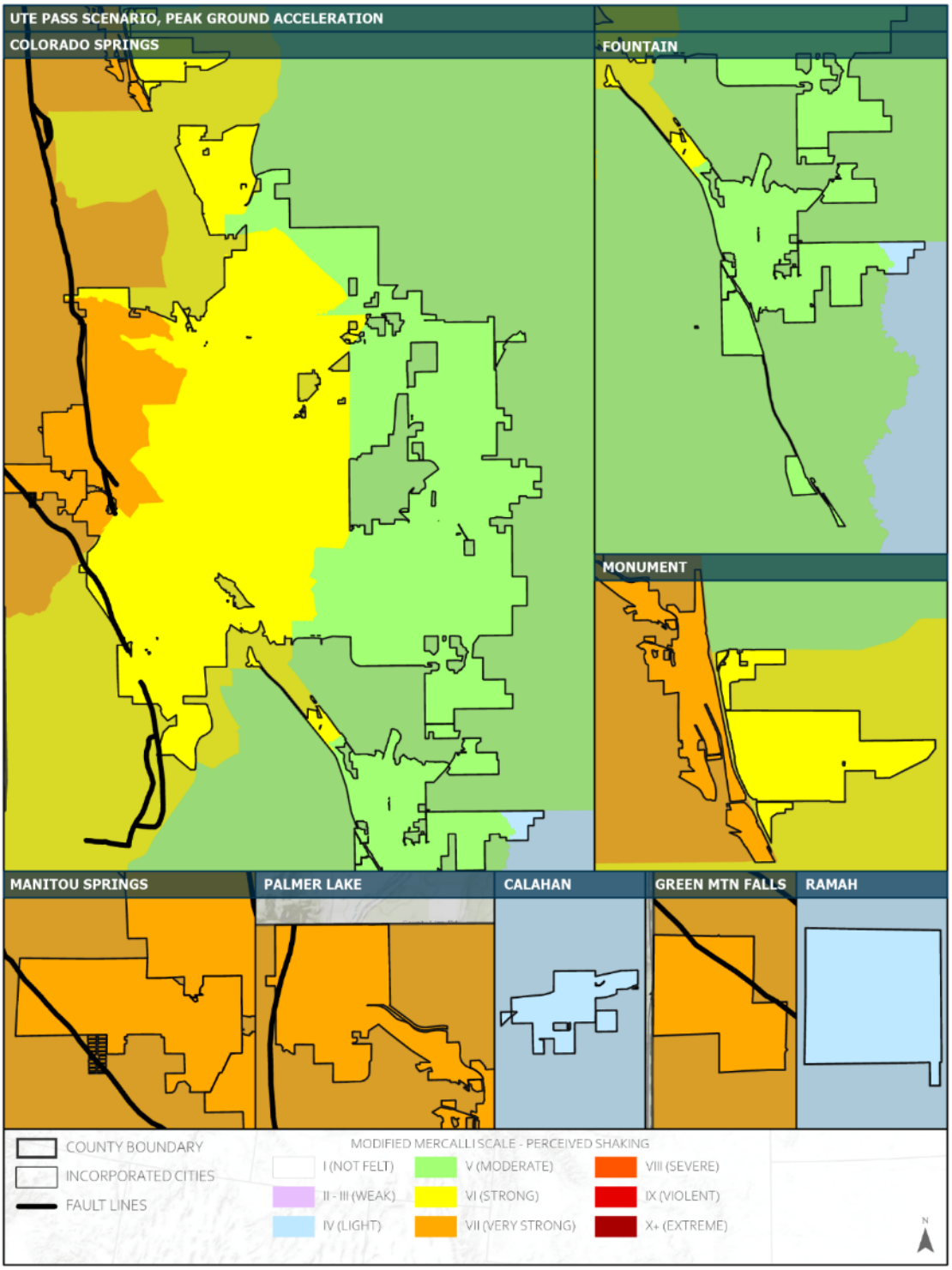


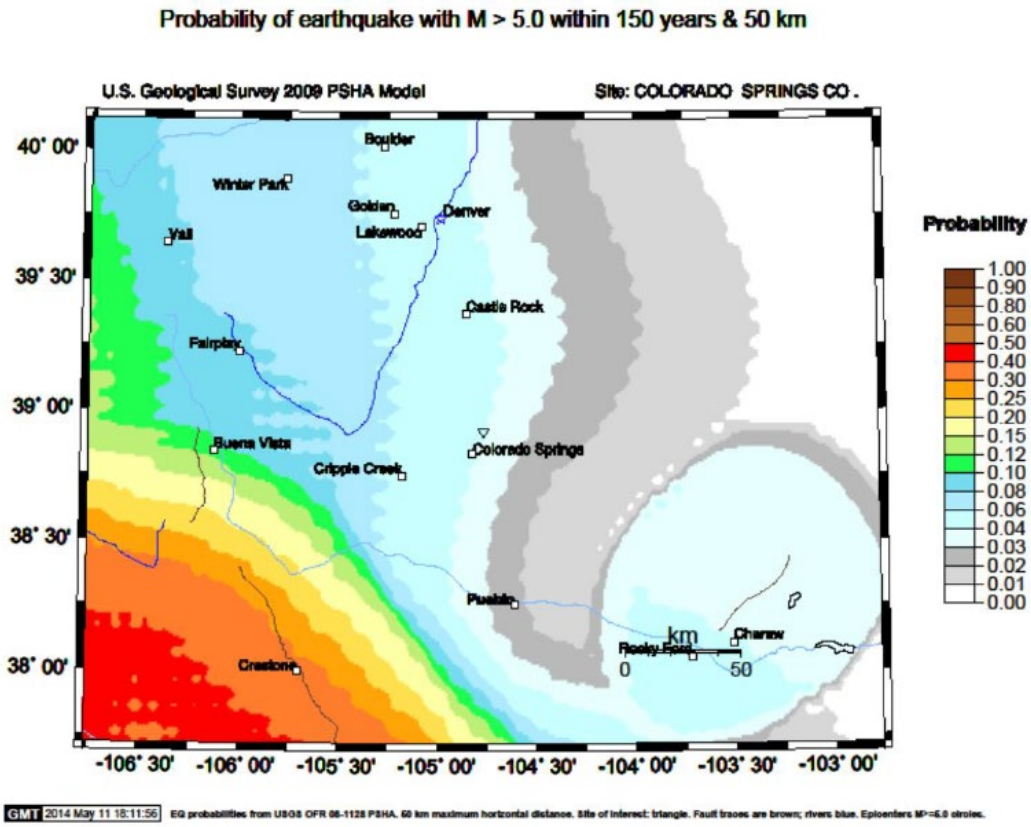
Figure 4-45: Ute Pass Fault Scenario, Magnitude 6.0, Participating Jurisdictions



Probability of Future Occurrence

The occurrence of earthquakes is relatively infrequent in Colorado, and the historical earthquake record is short (only about 130 years). Research based on Colorado's earthquake history suggests that an earthquake of 6.3 or larger has a one percent (1 percent) probability of occurring each year somewhere in Colorado (Charlie, Doehring, Oaks Colorado Earthquake Hazard Reduction Program Open File Report 93-01, 1993). According to the U.S. Geological Survey, the probability that a magnitude 5 or greater earthquake will occur in the next 50 years in El Paso County is 3 percent or less. The probability of such an event occurring in the next 150 years is 6 percent or less (Figure 4-46). Small earthquakes that cause no or little damage are more likely. Overall, the probability of a damaging earthquake somewhere in the county is considered **unlikely**, with less than 1-percent chance of occurrence in any given year.

Figure 4-46: Probability of Earthquake with Magnitude Greater Than 5.0 Occurring Within 50 Kilometers of Colorado Springs, Colorado in 150 Years



Magnitude / Severity

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Damage and life loss can be particularly devastating in communities where buildings were not designed to withstand seismic forces (e.g., historic structures). Other damage-causing effects of earthquakes include surface rupture, fissuring,

settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, rock falls, liquefaction, fires, dam failure, and hazardous materials incidents.

Generally, the severity of an earthquake event can be measured in the following terms:

- How hard did the ground shake?
- How did the ground move? (Horizontally or vertically)
- How stable was the soil?
- What is the fragility of the built environment in the area of impact?

According to the information in this hazard profile, a large earthquake's impact on the region could be considered **critical**—major or long-term property damage that threatens structural stability; interruption of essential facilities for 24 to 72 hours.

However, due to the low probability of damaging earthquakes, the overall significance is considered **low**, with limited potential impact for participating jurisdictions in the eastern county and **moderate,** with some potential impact, for jurisdictions that are in closer proximity to the two identified fault lines.

Warning Time

Minimal: Less than 6 hours. Part of what makes earthquakes so destructive is that they generally occur without warning. The main shock of an earthquake can usually be measured in seconds, and rarely lasts for more than a minute. Aftershocks can occur within the days, weeks, and even months following a major earthquake.

By studying the geologic characteristics of faults, geoscientists can often determine when the fault last moved and estimate the magnitude of the earthquake that produced the last movement. Because the occurrence of earthquakes is relatively infrequent in Colorado and the historical earthquake record is short, accurate estimations of magnitude, timing, or location of future dangerous earthquakes in Colorado are difficult to estimate.

There is currently no reliable way to predict the day or month that an earthquake will occur at any given location. Research is being done with warning systems that use the low energy waves that precede major earthquakes. These potential warning systems give approximately 40 seconds notice that a major earthquake is about to occur. The warning time is very short, but it could allow for someone to get under a desk, step away from a hazardous material they are working with, or shut down a computer system.

Exposure and Losses

➢ Property

Property losses were estimated through Level 2 Hazus-MH analysis for the 500-year probabilistic earthquake, the Rampart Fault scenario event, and the Ute Fault scenario event. Table 4-50 shows the results.

Table 4-50: Estimated Building Loss Associated with Earthquake

	Building Damage	Contents Damage	Inventory Loss	Total
500-Year Earthquake	$37,418,580	$6,802,580	$136,500	$44,357,660
Rampart Fault Scenario	$790,097,010	$204,433,440	$3,459,040	$997,989,490
UTE Pass Fault Scenario	$714,591,360	$194,940,810	$4,081,030	$913,613,200
Building **Damage**: Loss **due to the** repair or replacement **of structural and nonstructural damage** Content**s Damage**: Loss from contents Inventory Loss: Loss **due to commercial inventory damage** Total: Sum of building, content and inventory loss.				

Although all buildings in the planning area are potentially exposed, those that are in proximity to the two identified fault lines, Rampart and Ute Faults, are at greater risk for damage. Further, older structures that are not structurally sound may also be at greater risk of damage due to seismic events.

Table 4-51 identifies significant milestones in building and seismic code requirements that directly affect the structural integrity of development. Using these time periods, the planning team identified the number of structures in the planning area by date of construction. The number of structures does not reflect the number of total housing units, as many multi-family units and attached housing units are reported as one structure. Approximately 34 percent of the planning area's structures were constructed after the Uniform Building Code was amended in 1994 to include seismic safety provisions. Approximately 7 percent were built before 1933 when there were no building permits, inspections, or seismic standards.

Table 4-51: Age of Structures in Planning Area

Time Period	Number of Structures in Planning Area	%	Significance of Time Frame
Before 1933	14,707	7%	Before 1933, there were no explicit earthquake requirements in building codes. State law did not require local governments to have building officials or issue building permits.
1933-1940	1,476	1%	In 1940, the first strong motion recording was made.
1941-1960	25,111	11%	In 1960, the Structural Engineers Association of California published guidelines on recommended earthquake provisions.
1961-1975	43,666	20%	In 1975, significant improvements were made to lateral force requirements.
1976-1994	60,632	28%	In 1994, the Uniform Building Code was amended to include provisions for seismic safety.
1995-Present	74,330	34%	Seismic code is currently enforced.
Unknown	70	0%	-

The HAZUS-MH analysis estimated the amount of earthquake-caused debris in the planning area for the 500-year earthquakes, Rampart Fault scenario event, and the Ute Pass Fault scenario event, as summarized in Table 4-52.

Table 4-52: Estimated Earthquake-Caused Debris

Earthquake Scenario	Debris to Be Removed (tons)
500-Year Earthquake	24,500
Rampart Fault Scenario	438,730
Ute Pass Fault Scenario	410,610

Population

The entire population of El Paso County is potentially exposed to direct and indirect impacts from earthquakes. The degree of exposure is dependent on many factors, including the age and construction type of the structures people live in, the soil type their homes are constructed on, their proximity to fault location, etc. Whether impacted directly or indirectly, the entire population will have to deal with the consequences of earthquakes to some degree. Business interruption could keep people from working, road closures could isolate populations, and loss of functions of utilities could impact populations that suffered no direct damage from an event itself.

Impacts on persons and households in the planning area were estimated for the 500-year probabilistic earthquake, the Rampart Fault scenario event, and the Ute Fault scenario event through the Level 2 Hazus-MH analysis. Table 4-53 summarizes the results.

Table 4-53: Estimated Earthquake Impact on Persons and Households

	Number of Displaced Households	Number of People Requiring Temporary Shelter
500-Year Earthquake	19	12
Rampart Fault Scenario	611	336
UTE Pass Fault Scenario	754	415

Environment

Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts are considered. Some examples of impacts are listed below:

- Induced flooding and landslides
- Poor water quality
- Damage to vegetation
- Breakage in sewage or toxic material containments

Critical Facilities and Infrastructure

All critical facilities in the planning area are exposed to the earthquake hazard. Hazardous materials releases can occur during an earthquake from fixed facilities or transportation-related incidents. Transportation corridors can be disrupted during an earthquake, leading to the release of materials to the

surrounding environment. Facilities holding hazardous materials are of particular concern because of possible isolation of neighborhoods surrounding them. During an earthquake, structures storing these materials could rupture and leak into the surrounding area or an adjacent waterway, having a disastrous effect on the environment.

Level of Damage & Time to Return to Functionality

HAZUS-MH classifies the vulnerability of critical facilities to earthquake damage in five categories: no damage, slight damage, moderate damage, extensive damage, or complete damage. The model was used to assign a vulnerability category to each critical facility in the planning area except HAZMAT facilities and "other infrastructure" facilities, for which there are no established damage functions.

HAZUS-MH also estimates the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, HAZUS-MH may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90.

The analysis of critical facilities in the planning area was performed for the Rampart Fault and Ute Pass Fault earthquake events. Table 4-54 and Table 4-55 summarize the level of damage results and the probability of being functional at Day 1 and Day 14 after the event.

Table 4-54: Critical Facility Impacts, Rampart Fault Scenario

Category	Total Number of Facilities	Slight Damage	Moderate Damage	Extensive Damage	% Functional @ Day 1	% Functional @ Day 14
Highway Bridges	657	1	2	0	99%	100%
Rail Bridges	77	0	0	0	100%	100%
Communications	32	0	0	0	99%	100%
Government Functions	2	0	0	0	70%	87%
Medical and Health	12	0	0	0	76%	90%
Power	8	1	0	0	92%	99%
Protective Functions	88	4	5	0	77%	89%
Schools	282	11	4	0	77%	90%
Transportation	9	4	1	0	93%	97%
Wastewater	54	10	2	0	80%	98%
Water Supply	2	0	0	0	92%	100%
Total/Average	1,223	31	14	0	87%	95%

Table 4-55: Critical Facility Impacts, Ute Pass Fault Scenario

Category	Total Number of Facilities	Slight Damage	Moderate Damage	Extensive Damage	% Functional @ Day 1	% Functional @ Day 14

Highway Bridges	657	0	0	1	99%	100%
Rail Bridges	77	0	0	0	100%	100%
Communications	32	3	0	0	96%	100%
Government Functions	2	0	0	0	61%	80%
Medical and Health	12	0	0	0	73%	88%
Power	8	3	0	0	91%	99%
Protective Functions	88	6	2	0	77%	89%
Schools	282	6	2	0	77%	90%
Transportation	9	5	0	0	97%	99%
Wastewater	54	12	0	0	81%	99%
Water Supply	2	0	0	0	83%	100%
Total/Average	1,223	35	4	1	85%	95%

4.9.1.4 Consequence Analysis

Earthquake Consequence Analysis	
Category	**Narrative**
Hazard Description	Earthquakes are a regional hazard that would affect all areas of the Pikes Peak region with varying magnitude and severity. Figure 4-40 illustrates both the presence of quaternary faults in the region and the epicenters of historical events. The Ute Pass Fault Zone runs approximately along State Highway 67 and US Highway 24 to the western edge of the city, and the smaller fault to the east of the Ute Pass Fault Zone is the Rampart Range Fault.
Impact to Property, Facilities, and Infrastructure	Buildings, vehicles, signage, and/or any unsecured property may be damaged or destroyed during a significant event. Although all buildings in the planning area are potentially exposed, those that are in proximity to the two identified fault lines, Rampart and Ute Faults, are at greater risk for damage. Further, older structures that are not structurally sound may also be at greater risk of damage due to seismic events. The planning area is susceptible to close to a billion dollars of property losses resulting from a major earthquake event. Some property, facilities and infrastructure may be more vulnerable due to location near faults. Roads and bridges can be affected impacting emergency response and transportation/general travel. Impact to other critical infrastructures that could cause secondary effects (utilities failures, dam failures, etc.,). Communications may be negatively impacted.
Impact on the Environment	In addition to the initial damage and disruption caused by earthquakes, they can also trigger a series of aftershocks that can last for several days to several weeks. These aftershocks can cause additional damage and hinder recovery and rebuilding efforts. As described in the Colorado SEOP, earthquakes can trigger multiple secondary events including avalanche, dam failure, landslide, and subsidence. An earthquake can also trigger a HAZMAT incident by damage to the HAZMAT facility. The subsequent release of hazardous material could cause significant or irreparable harm to the environment. Damage to water treatment facilities can lead to water quality issues.
Impact on Responders	Damaged roadways and stalled vehicles would impede the ability of responders to navigate roadways in the affected areas. The sheer number of response requests could rapidly overwhelm the ability of local emergency services to respond and require requests for assistance from neighboring jurisdictions. Need for evacuation support such as door-to-door notification and traffic management may increase responder risk; potential impacts to communications lines may affect ability to effectively respond. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Infrastructure personnel considered responders due to responsibilities would also be impacted.

Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Potential interruption of essential facilities for more than 72 hours. Power interruption is likely if not adequately equipped with backup generation. A large scale of event would typically overwhelm emergency response and coordination services and may require mutual aid assistance from outside the impacted area.
Impact on the Public	Multiple deaths, injuries and/or trapped people in need of search and rescue. For the modeled scenarios in this Plan, the most intense ground shaking and damage would be in the western half of the County, which includes the downtown areas of Colorado Springs and Manitou Springs, where a large number of people would either be at work, traveling to or from activities, and/or residing. Significant ground shaking could damage structures, roads, critical infrastructure, and cause bodily harm or death.
Impact on the Economic Condition of the County	Potential loss of facilities or infrastructure function or accessibility and uninsured damages. Limited workforce and loss of businesses and tourism could also have a significant impact to the local economy.
Impact on the Public Confidence in Government	Confidence is highly dependent on the public's perception of how well response and recovery are handled during and after an event, particularly following large scale disaster events such as an earthquake. The public holds high expectations for rapid restoration of critical lifelines.

4.9.1.5 Secondary Hazards

Earthquakes can cause large and sometimes disastrous landslides and mudslides. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people. Fires can be started by broken gas and power lines. Earthen dams and levees are highly susceptible to seismic events and the impacts of their eventual failures can be considered secondary risks for earthquakes. Seiches are like small tsunamis and can occur on lakes that are shaken by the earthquake. Seiches are usually only a few meters high but can still flood or knock down homes and trees.

4.9.1.6 Future Condition Impacts

Development in the planning area is regulated through building standards and performance measures to reduce the degree of risk for new construction. The area building departments are governed by the International Building Code, which includes provisions for seismic safety.

Climate change and its impact on weather and interaction on the surface may have an impact on future probability and severity of earthquakes; however, the extent of those impacts is unknown. Future climate scenarios generally suggest that the climate in Colorado will be warmer and drier with occasional extreme

precipitation. Increased temperature and extreme precipitation may also increase the potential for secondary impacts due to seismic activity, such as increased liquefaction due to saturated soils.

4.9.1.7 Issues

Important issues associated with an earthquake include but are not limited to the following:

- Approximately 34 percent of the planning area's building stock was built after 1994, when seismic provisions became uniformly applied through building code applications.
- Critical facility owners should be encouraged to create or enhance continuity of operations plans using the information on risk and vulnerability contained in this plan.
- Geotechnical standards should be established that take into account the probable impacts from earthquakes in the design and construction of new or enhanced facilities.
- Earthquakes could trigger other natural hazard events such as dam failures and landslides, which could severely impact the region.
- A worst-case scenario would be the occurrence of a large seismic event during a flood or high-water event. Failures could happen at multiple locations, increasing the impacts of the individual events.
- Retrofitting buildings to meet earthquake seismicity standards may be cost-prohibitive.
- Dams located in the County may not have been engineered to withstand probable seismic events.

4.9.2 SUBSIDENCE AND SINKHOLES

4.9.2.1 Definition and Extent

Subsidence is defined by the Colorado Geological Survey as the sinking of the land over man-made or natural underground voids. Subsidence can occur gradually over a prolonged period of time, or abruptly in the form of sinkholes. In Colorado there are three types of subsidence that warrant the most concern: settlement related to collapsing soils, sinkholes in karst areas, and the ground subsidence over abandoned mine workings.

DEFINITIONS

Subsidence: The sinking of land over human caused or natural underground voids and the settlement of native low-density soils.

Sinkhole: A sudden collapse of the land surface to form a hole in the ground.

Collapsible Soils

Collapsible soils are a group of soils that can rapidly settle or collapse the ground. These soils are low in density and in moisture content and are loosely packed together. Agents that bind these loosely packed particles together, such as clay and silk buttresses, are water sensitive. When water is introduced to these soils, the binding agents may quickly break down, soften, disperse, or dissolve. This results in a reorganization of the soil particles in a more dense arrangement, which in turn results in a net volume loss indicated by resettlement or subsidence at the surface (CGS, 2014). Volume loss can be between 10 to 15 percent, which can result in several feet of surface-level displacement.

Sinkholes in Karst Areas

Most sinkholes in Colorado are related to the dissolution of evaporative rocks. Evaporative rocks are composed of minerals that dissolve in water, including gypsum, halite, or limestone. The term karst describes a landscape that has been shaped by the dissolution of these types of bedrocks (CGS, 2014). According to a newsletter issued by the Colorado Geological Survey, "two characteristics of evaporative bedrock are important. One is that evaporative minerals can flow, like a hot plastic, when certain pressures and temperatures are exceeded. The second, and most important to land use and development, is that evaporative minerals dissolve in the presence of freshwater. It is this dissolution of the rock that creates caverns, open fissures, streams out letting from bedrock, breccia pipes, subsidence sags and depressions, and sinkholes (Colorado Geological Survey, 2001).

Factors leading to the formation of sinkholes in these landscapes may be natural or may be induced by human activities. Natural contributing factors include the downward percolation of surface water through the rock formation or the lateral movement of water within a water table. Human activities that may contribute to such subsistence include stream channel changes, irrigation ditches, land irrigation, leaking or broken pipes, temporary or permanent ponding of surface waters, and mining of soluble materials by means of forced circulation or water (Colorado Geological Survey, 2014).

Abandoned Mine Workings

The underground removal of minerals and rock can undermine underground support systems and lead to void spaces. These voids can then be affected by natural and man-made processes such as caving, changes in flowage, or changes on overlying rock and soil material resulting in collapse or subsidence. Hazards from these abandoned sites are complicated by the fact that many "final mine maps" are inaccurate or incomplete (Colorado Geological Survey, 2014). Mines operating after August of 1997 were required by Federal and State law to take potential surface subsidence into account; however, mining has been an activity in the State since the 1860s (Colorado Geological Survey, 2001). There are some mapped, known mine hazard areas in Colorado; however, it is likely that there are additional hazard areas for which no records exist.

4.9.2.2 Previous Occurrences

The occurrence of subsidence is an on-going process resulting from natural and human induced causes. From 1979 to 1983 there were 22 mine subsidence events classified as emergencies in Colorado Springs and the majority occurred in the Cragmor-Country Club area. The Office of Surface Mining incurred $767,000 in costs due to the events (Dames and Moore, 1985).

Table 4-56 documents some of the known subsidence and sinkhole events occurring in the Region.

Table 4-56: Subsidence and Sinkhole History in El Paso County and Vicinity

Year	Location	Description of Event
1979	Colorado Springs	Massive sinkhole 20-25 feet around an abandoned shaft of the Klondike Mine opened up near I-25 and Woodmen Road.
2005	Colorado Springs	Subsidence in Country Club neighborhood during concrete pumping activities to fill abandoned mine shafts.

2009	Colorado Springs	Massive sinkhole opened up in the front yard of a Broadmoor home. The hole was approximately 25 feet deep and likely caused by leaking water.
2013		During a flooding event impacting El Paso County, sinkholes destroyed roads, including a 40-foot wide and 25-foot deep sinkhole that opened underneath a driveway, exposing a gas line (Heilman and Sinclair, 2013).
2015		The record rainfall in May 2015 caused several sinkholes to open up, especially on roads.
2018	El Paso County south of Fountain	Flooding washed out a 48-inch culvert across Old Pueblo Road at Birdsall Road, creating a deep, wide ditch. A driver and two firefighters were seriously injured after their vehicles fell into the sinkhole.

Figure 4-47: Old Pueblo Road After a Sinkhole Trapped Two Cars and a Firetruck on July 24, 2018

Source: CBS Denver, https://denver.cbslocal.com/2018/07/24/driver-firefighters-injured-sink-hole/

4.9.2.3 Vulnerability

Table 4-57: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Unlikely	NA	NA	NA	Negligible	Negligible
Colorado Springs	Occasional	Critical	Limited	Significant	Minor	Moderate
El Paso County	Occasional	Limited	Limited	Significant	Minor	Low
Fountain	Unlikely	NA	NA	NA	Negligible	Negligible
Green Mtn Falls	Unlikely	NA	NA	NA	Negligible	Negligible
Manitou Springs	Unlikely	Limited	Limited	Significant	Negligible	Low
Monument	Unlikely	NA	NA	NA	Negligible	Negligible
Palmer Lake	Unlikely	NA	NA	NA	Negligible	Negligible
Ramah	Unlikely	NA	NA	NA	Negligible	Negligible
Regionwide	Occasional	Limited	Limited	Significant	Minor	Low

Spatial Extent and Geographic Location

The Colorado Geological Survey (CGS) Abandoned Mine Land Inventory (AMLI) project identified roughly 18,000 abandoned mine-related features on National Forest System lands in Colorado between 1991 and 1999. The mine-related features include mine openings, waste rock dumps, tailings dumps, and mine structures. The Colorado Division of Reclamation, Mining and Safety (DRMS) estimated that there are approximately 23,000 abandoned mines in Colorado. The Region's mining past may pose potential risk to current and future development. Subsidence is more likely to occur on the surface directly above abandoned coal mining operations.

"Within Colorado, the Colorado Springs area probably has the highest potential for subsidence and related damage because the region includes several fully developed areas located over very shallow mines. Approximately 2,400 acres of the city are undermined by inactive coal mines (Dames and Moore, 1985)." The Rockrimmon Area, Cragmor/Country Club Area, Palmer Park, and Rustic Hills are at increased risk of subsidence due to their location atop very shallow mine workings.

Areas in the region highly susceptible to subsidence are displayed in Figure 4-48 and Figure 4-49. Figure 4-50 shows the combination of high precipitation and historic case studies that may result in favorable environments for collapsible soils.

Figure 4-48: Subsidence and Sinkhole Susceptibility, El Paso County

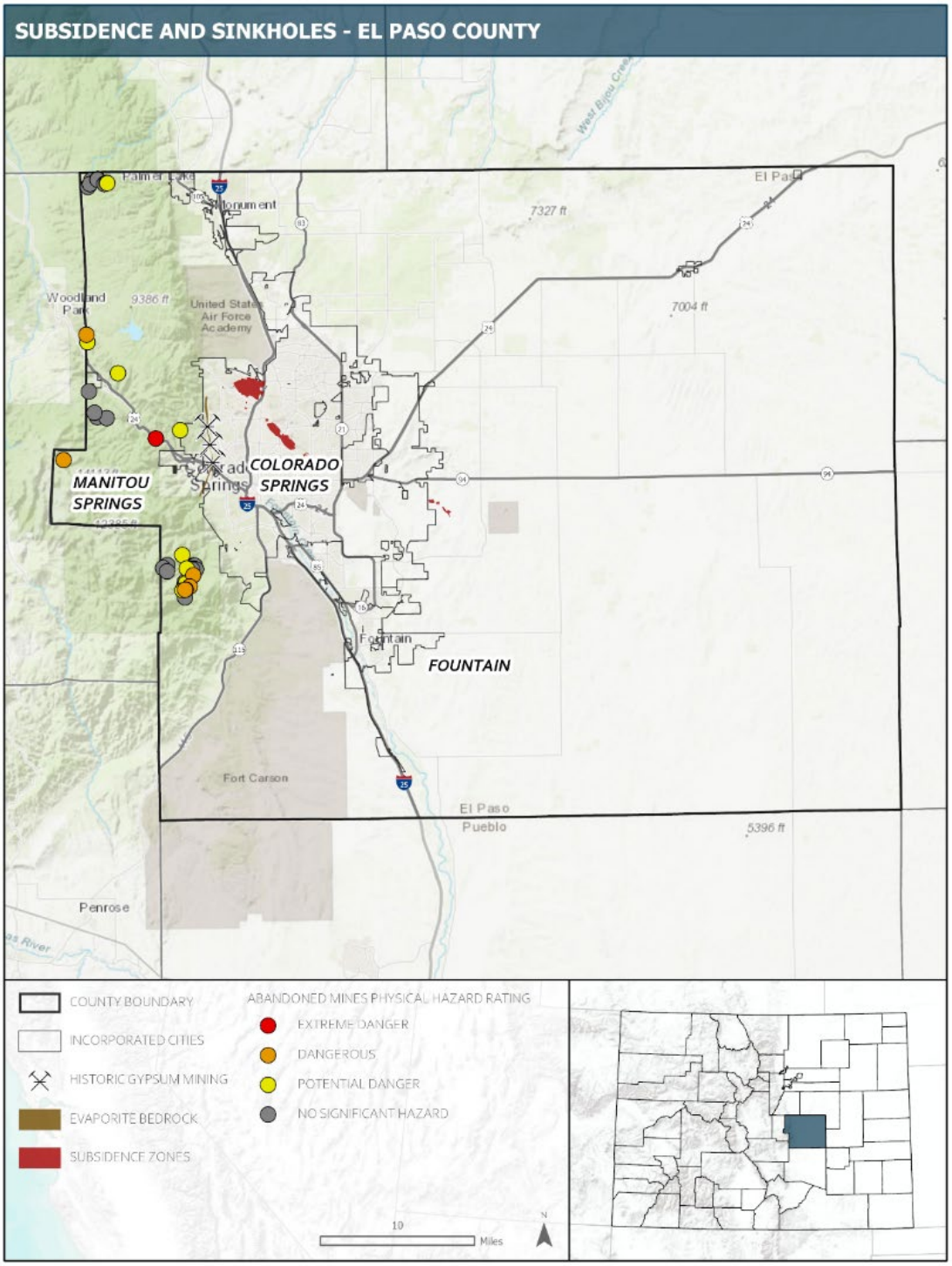


Figure 4-49: Subsidence and Sinkhole Susceptibility, Colorado Springs

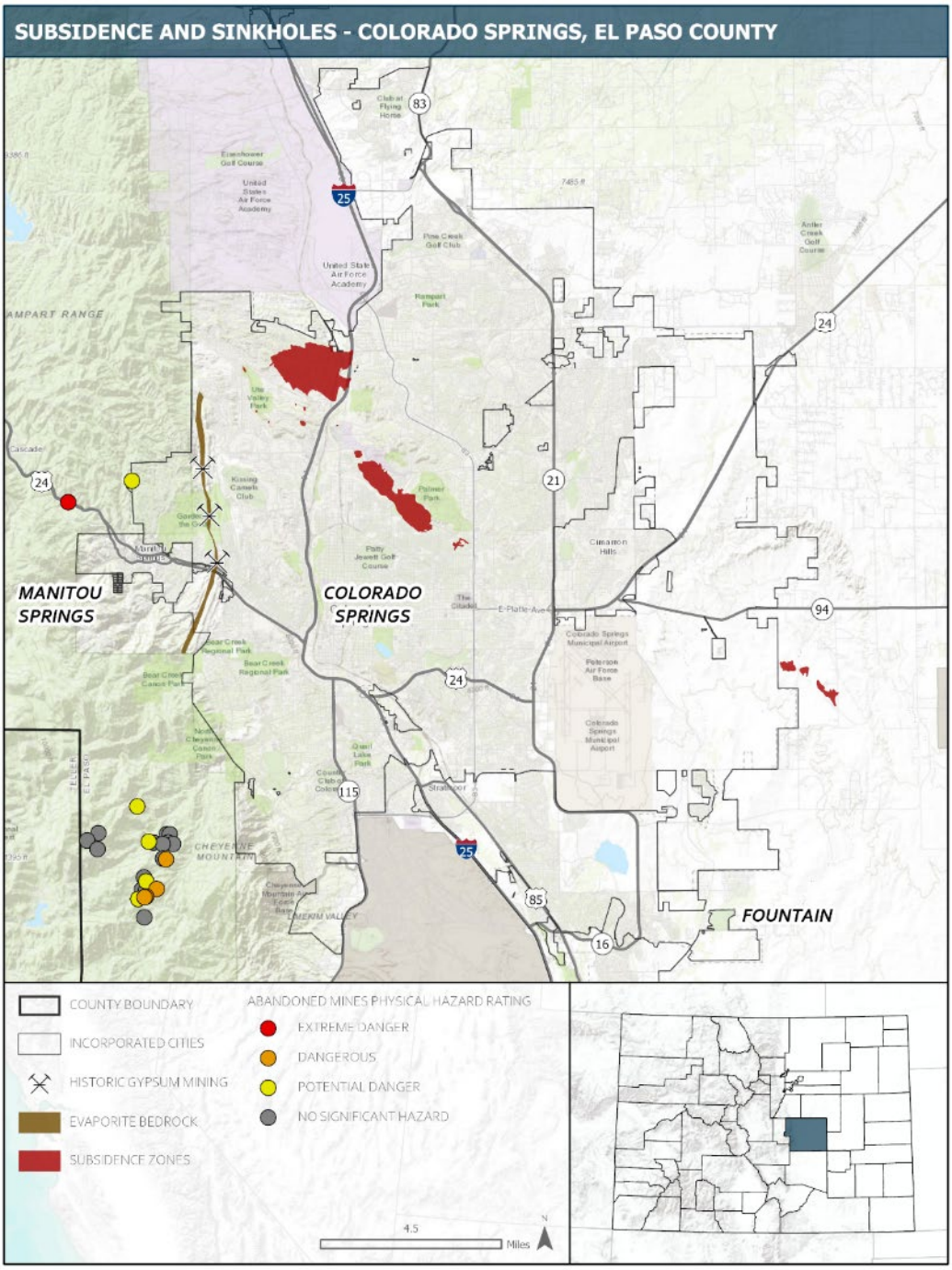
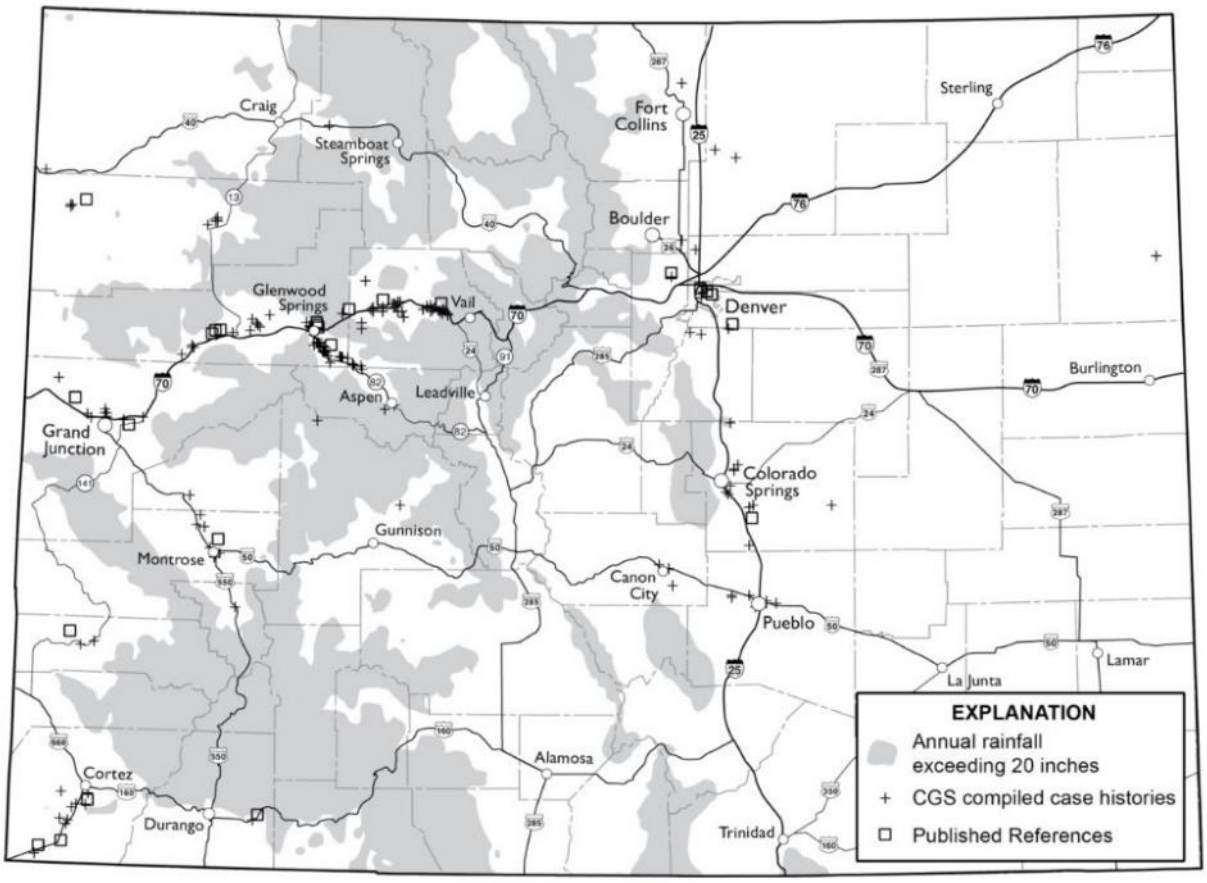


Figure 4-50: Collapsible Soil Susceptibility



Collapsible soil case histories in Colorado. Precipitation data from USDA-NRCS, National Cartography And Geospatial Center, Ft. Worth, Texas, 1999, Ft. Worth, Texas, 1999.

Probability of Future Occurrence

Occasional: 1 to 25 percent annual probability (Colorado Springs and El Paso County)

Unlikely: Less than 1 percent annual probability (Calhan, Fountain, Green Mountain Falls, Manitou Springs, Monument, Palmer Lake, Ramah)

Subsidence and sinkholes as well as soil erosion and deposition are occurring continuously throughout the County. However, the occurrence of a significant event is rare. Large precipitation events as well as human activity may influence the frequency of these events within the County.

In a study conducted by Dames and Moore in 1985, The Colorado Springs Subsidence Investigation, it was determined that the highest hazards for subsidence occurred in the Cragmor/Country Club Area, Palmer Park, and Rustic Hills, over areas where room and pillar and extraction techniques were utilized by previous mining activity. The probabilities are noted in Table 4-58.

Table 4-58: High Hazard Zones for Subsidence in Colorado Springs, 1985

Area	Type of Mining	Total Overburden Thickness	Probability of Subsidence	Assigned Hazard
Cragmor/Country Club, Palmer Park, Rustic Hills	Room & Pillar	0-67.5'	.32	High
Cragmor/Country Club, Palmer Park, Rustic Hills	Extraction	0-67.5'	.27	High
Rockrimmon	Extraction	-	NA	High

Magnitude / Severity

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

Damage from subsidence can range from hairline cracks in plaster or wall board, to damaged foundations, to major road failure with injury and/or death in the case of abrupt failure. The severity of subsidence and sinkholes as well as soil erosion and deposition is largely related to the extent and location of areas that are impacted. Such events can cause property damage as well as loss of life; however, events may also occur in remote areas of the County where there is little to no impact to people or property. According to the CGS, "In general, the type and severity of surface subsistence is governed by the amount of ground surface and the location of removal or compression, and the geological conditions of a particular site" (Colorado Geological Survey, 2014).

However, these impacts are highly localized, so the overall significance to the County and to the participating jurisdictions that are not near subsidence-prone areas (for example the towns of Calhan and Ramah) is considered **limited**: low potential impact.

Warning Time

Subsidence can happen suddenly and without warning or can occur gradually over time. The rate of subsidence may be intensified as a result of natural or human-induced activities. According to CGS, there are some instances where the rate of subsidence can be calculated, particularly subsidence that occurs as a result of mining activities (Colorado Geological Survey, 2001):

> *Where longwall mining is active and subsidence is a well-documented and predictable action, surface response to ongoing mining can be accurately estimated. However, in the case of room and pillar mines, specially where they are inaccessible and record-keeping may be inaccurate, predictions of when subsidence will happen are not possible.*
>
> *How much subsidence will occur and the features that will appear at the surface depend not only on the type of mining but on geology and several physical features of the voids left by mining. Some general rules of thumb are:*
>
> - *The larger the mine opening height and width, the larger the subsidence feature at the surface;*

- *The shallower the mine below ground, the more noticeable the surface subsidence evidence; however, in Colorado, pits have been found over mines as deep as 350 feet;*
- *The strength of the rock above the coal seam influences whether subsidence will reach the surface and the kind of features that can appear.*

Exposure and Losses

➢ Property

Structures and other improvements located in areas prone to subsidence or soil erosion are exposed to risk from these hazards. Property exposed to subsidence can sustain minor damages or can result in complete destruction. According to CGS, merely an inch of differential subsidence beneath a residential structure can cause several thousand dollars of damage. Structures may be condemned as a result of this damage resulting in large losses. FEMA estimates that there are over $125 million in losses in the U.S. annually as a result of subsidence. Structures exposed to erosion hazard areas may be undermined, resulting in damages. This may also result in the condemnation of a structure.

There are 5,668 structures within the identified subsidence susceptibility areas in Colorado Springs and 251 structures in El Paso County.

➢ Population

Residents of the County living or travelling in areas prone to subsidence and erosion are exposed to the hazard. The risk of injury or fatalities as a result of this hazard is limited, but possible. Spontaneous collapse and opening of voids are rare, but still may occur resulting in death or injury to any people in the area at the time. It is likely that any such injuries would be highly localized to the area directly impacted by an event.

There are 16,569 people residing within the identified subsidence susceptibility areas in Colorado Springs and 396 in El Paso County.

➢ Environment

Subsidence is a naturally occurring processes but can still cause damage to the natural environment. Environments located in areas prone to subsidence and deposition are exposed.

➢ Critical Facilities and Infrastructure

Any critical facilities or infrastructure that are located on or near areas prone to subsidence or soil erosion are exposed to risk from the hazard. Subsidence can result in serious structural damage to critical facilities and infrastructure such as roads, irrigation ditches, underground utilities, and pipelines. According to CGS, large ground displacements caused by collapsing soils can totally destroy roads and structures and alter surface drainage. Minor cracking and distress may result as the improvements respond to small adjustments in the ground beneath them. Structures and underground utilities found in areas prone to subsidence can suffer from distress. The shifting and settling of the structure can be seen in a number of ways:

- Settlement, cracking and tilting of concrete slabs and foundations,
- Displacement and cracking in door jams, window frames, and interior walls, or
- Offset cracking and separation in rigid walls such as brick, cinderblock, and mortared rock (CGS, 2001).

4.9.2.4 Consequence Analysis

Subsidence and Sinkhole Consequence Analysis	
Category	**Narrative**
Hazard Description	Former mining areas in the Region are of concern for subsidence. Colorado Springs' mining past may pose potential risk to current and future development. Subsidence is more likely to occur on the surface directly above abandoned coal mining operations. More specifically, these areas include the Rockrimmon Area, Cragmor/Country Club Area, Palmer Park, and Rustic Hills. Karst or subterranean drainage areas, and collapsible soils could also pose a threat. Landslide and subsidence as the original event can trigger secondary or cascading impacts that exacerbate risk from other hazards. As described in the Colorado SEOP, a landslide near a dam could trigger a dam failure. It can also trigger a flood by damming a water source or subsidence. A landslide could also trigger a transportation problem and a utility disruption. Subsidence could undermine transportation routes.
Impact to Property, Facilities, and Infrastructure	Damage from subsidence can range from hairline cracks in plaster or wall board, to damaged foundations, to major road failure with injury and/or death in the case of abrupt failure. There are also hundreds of structures located in Central Colorado Springs and the Rockrimmon undermined areas leaving these structures vulnerable to subsidence.
Impact on the Environment	Subsidence events can alter the morphology and hydrology of an impacted area.
Impact on Responders	Damaged roadways and stalled vehicles would impede the ability of responders to navigate roadways in the affected areas. The sheer number of response requests could rapidly overwhelm the ability of local emergency services to respond and require requests for assistance from neighboring jurisdictions. Need for evacuation support such as door-to-door notification and traffic management may increase responder risk; potential impacts to communications lines may affect ability to effectively respond. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by damaged roadways.

Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	None, or limited loss of facilities or infrastructure function or accessibility, or ability to provide services. May have limited power interruption if not adequately equipped with backup generation. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from landslide and subsidence.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses. Damage from subsidence can range from hairline cracks in plaster or wall board, to damaged foundations, to major road failure with injury and/or death in the case of abrupt failure.
Impact on the Economic Condition of the County	None, or limited loss of facilities or infrastructure function or accessibility, and limited uninsured damages.
Impact on the Public Confidence in Government	Characteristics of expansive soils such as duration and speed of onset result in limited response functions for government beyond building inspection and repair.

4.9.2.5 Secondary Hazards

Events that cause damage to improved areas can result in secondary hazards such as explosions from natural gas lines, loss of utilities such as water and sewer due to shifting infrastructure, and potential failures of reservoir dams. Additionally, these events may occur simultaneously with other natural hazards such as flooding. Erosion can cause undercutting that can result in an increase in landslide or rockfall hazards. Additionally, erosion can result in the loss of topsoil, which can affect agricultural production in the area. It can also damage the engines of machinery and reduce visibility for drivers. Deposition can have impacts that aggravate flooding, bury crops, or reduce capacities of water reservoirs.

4.9.2.6 Future Condition Impacts

Central Colorado Springs and the Rockrimmon undermined areas are already heavily developed; subsidence would be a concern for continued development and redevelopment in these areas. Jurisdictions in the planning area should ensure that known hazard areas are regulated under their planning and zoning programs. In areas where hazards may be present, permitting processes should require geotechnical investigations to access risk and vulnerability to hazard areas.

Changes in precipitation events and the hydrological cycle may result in changes in the rate of subsidence and soil erosion. According to a 2003 paper published by the Soil and Water Conservation Society (Soil and Water Conservation, 2003):

> *The potential for climate change–as expressed in changed precipitation regimes–to increase the risk of soil erosion, surface runoff, and related environmental consequences is clear. The actual damage that would result from such a change is unclear. Regional, seasonal, and temporal variability in precipitation is large both in simulated climate regimes and in the existing climate*

record. Different landscapes vary greatly in their vulnerability to soil erosion and runoff. Timing of agricultural production practices creates even greater vulnerabilities to soil erosion and runoff during certain seasons. The effect of a particular storm event depends on the moisture content of the soil before the storm starts. These interactions between precipitation, landscape, and management mean the actual outcomes of any particular change in precipitation regime will be complex.

4.9.2.7 Issues

The major issues for subsidence and sinkholes are the following:

- Onset of actual or observed subsidence in many cases is related to changes in land use. Land uses permitted in known hazard areas should be carefully evaluated.
- Knowledge of hydrologic factors is critical for evaluating most types of ground subsidence.
- Abandoned mine information is incomplete. There are likely to be hazardous areas in addition to known locations.
- Some housing developments have had subsidence hazard investigations completed before development. This practice should be expanded.
- Homeowners within an undermined area that were built before 1989 are eligible to participate in the Mine Subsidence Protection Program, a federal program operated by the Mined Land Reclamation Board of the Division of Minerals and Geology. Homes built after 1989 are not covered.
- Many older sinkholes have been covered with recent soil infilling and are completely concealed at the surface
- More detailed analysis should be conducted for critical facilities and infrastructure exposed to hazard areas. This analysis should address how potential structural issues were addressed in facility design and construction.

4.9.3 LANDSLIDE / ROCKFALL

4.9.3.1 Definition and Extent

Landslides include a wide range of ground movements from rock fall to slope failure and are primarily attributed to gravity acting on steep slopes. Some of the natural causes of ground instability are stream and lakeshore erosion, heavy rainfall, and poor-quality natural materials. In addition, many human activities tend to make the earth materials less stable and, thus, increase the chance of ground failure. Human activities contribute to soil instability through grading of steep slopes or overloading them with artificial fill, by extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation. Landslides typically have a slower onset and can be predicted to some extent by monitoring soil moisture levels and ground cracking or slumping in areas of previous landslide activity.

DEFINITIONS

Landslide: The sliding movement of masses of loosened rock and soil down a hillside or slope. Such failures occur when the strength of the soils forming the slope is exceeded by the pressure, such as weight or saturation, acting upon them.

Mass Movement: A collective term for landslides, debris flows, falls, and sinkholes.

Rockfall: the falling of a newly detached mass of rock from a cliff or down a very steep slope.

Landslides are caused by one or a combination of the following factors: change in slope of the terrain, increased load on the land, shocks and vibrations, change in water content, groundwater movement, frost action, weathering of rocks, and removing or changing the type of vegetation covering slopes. In general, landslide hazard areas are where the land has characteristics that contribute to the risk of the downhill movement of material, such as the following:

- A slope greater than 30 percent
- A history of landslide activity or movement during the last 10,000 years
- Stream or wave activity, which has caused erosion, undercut a bank, or cut into a bank to cause the surrounding land to be unstable
- The presence or potential for snow avalanches
- The presence of an alluvial fan, indicating vulnerability to the flow of debris or sediments
- The presence of impermeable soils, such as silt or clay, which are mixed with granular soils such as sand and gravel.

Slides and earth flows can pose serious hazard to property in hillside terrain. They tend to move slowly and thus rarely threaten life directly. When they move—in response to such changes as increased water content, earthquake shaking, addition of load, or removal of downslope support—they deform and tilt the ground surface. The result can be destruction of foundations, offset of roads, breaking of underground pipes, or overriding of downslope property and structures.

A **rockfall** is the falling of a detached mass of rock from a cliff or down a very steep slope. Weathering and decomposition of geological materials produce conditions favorable to rock falls. Rockfalls are caused by

the loss of support from underneath through erosion or triggered by ice wedging, root growth, or ground shaking. Changes to an area or slope such as cutting and filling activities can also increase the risk of a rockfall. Rocks in a rockfall can be of any dimension, from the size of baseballs to houses. Rockfalls can threaten human life, impact transportation corridors and communication systems, and result in other property damage.

Spring is typically the landslide/rockfall season in Colorado as snow melts and saturates soils, and temperatures enter into freeze/thaw cycles. Rockfalls and landslides are influenced by seasonal patterns, precipitation and temperature patterns. Earthquakes can also trigger rockfalls and landslides.

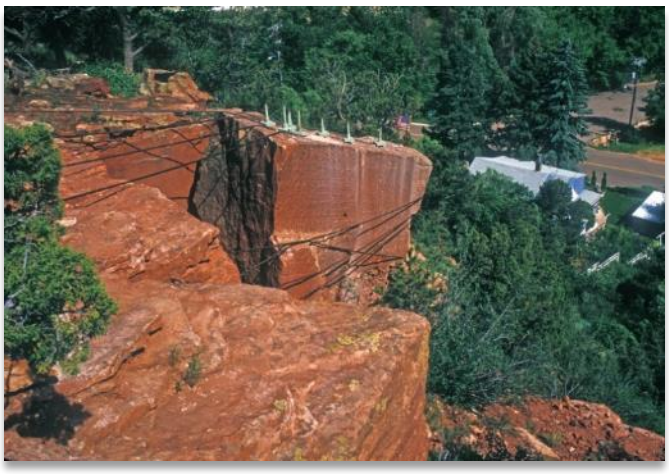
4.9.3.2 Previous Occurrences

There were no landslide events listed in the National Climatic Data Center Storm Events Database; however, there have been some recorded landslide or rockfall events within or near El Paso County. In the 2016 update of the City of Colorado Springs' hazard mitigation plan, the City notes that at least 39 landslide events occurred between 1959 and 2015. A selection of notable landslide and rockfall events are discussed in Table 4-59 below.

Figure 4-52: Constellation Drive Landslide, Colorado Springs, August 2015

Source: Photo T.C. Wait, Colorado Geological Society

Figure 4-51: Rock Fall in Manitou Springs, 1995



Source: Photo Jon White, Colorado Geological Society

Table 4-59: Notable Landslide and Rockfall Events in El Paso County

Date	Location	Description
May, 1995	Manitou Springs	Residents in Manitou Springs observed the movements of a large, dangerous block of rock before it could fall (Figure 4-51). This set into motion an emergency declaration by the town, which resulted in the compulsory evacuation of homes that were located below the rocky slope, the closing of the road in the area, and an immediate rock stabilization project (Colorado Geological Society, 1998).

May 18, 1995		Heavy rain caused a landslide and closed Highway 24 along Ute Pass. Two homes were condemned as a result of the slide and this incident prompted the City of Colorado Springs to request the Colorado Geological Survey to review developments within the city limits (Colorado Geological Society, 1998).
1999		Heavy rains caused tens of millions in damage from landslides. El Paso County and Colorado Springs declared a Presidential Disaster Area. Following this event, the City with help from FEMA purchased 25 homes damaged by landslides and razed them.
June 27, 2007		A large rock fall occurred on U.S. 24. The largest of three sandstone slabs that fell June 27 from the crown of the slope on the north side of the highway measured 20 feet high, 15 feet wide and 40 feet long. It was estimated to weigh about 30 tons. Another crossed into the highway and slammed into the freeway divider, damaging a 3-foot-wide chunk of concrete. Approximately 100 tons of boulders and debris were removed from the area below the slope (Johnson, 2007).
April 23, 2013		U.S. Highway 24 was closed in both directions after a rockfall event that left 150 tons of debris on the highway.
Summer 2013	Manitou Springs	Thunderstorms with heavy rain and hail caused four mud/rockslides that closed Highway 24 along Ute Pass. There were several rock and mudslides on other roads. At least one person is dead and three went missing in Manitou Springs on August 9th, 2013, after a mudslide and flash flooding event caused massive damage in an area burned by the Waldo Canyon wildfire from 2012.
Spring and Summer 2015	El Paso County/Colorado Springs	Heavy rains inundated Colorado Springs during spring and summer 2015, saturated slopes, and caused significant damage to public infrastructure and private residences (Figure 4-52). Over 30 homes were affected, causing over $7 million in damage. FEMA issued a Major Disaster Declaration and is undergoing a buyout process for residents.

4.9.3.3 Vulnerability

The general assessment for where landslides may occur within the Pikes Peak Region is somewhat predictable based on slope, aspect, vegetation, moisture content, and angle of bedrock amongst other variables. At the individual parcel level however, the threat of landslides typically requires further study. Individual soil properties, the type of human activity on the lot, and understanding previous failures in the specific area all influence the probability of a future event occurring.

Table 4-60: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Unlikely	NA	Negligible	NA	Negligible	Negligible
Colorado Springs	Likely	Critical	Moderate	Moderate	Minor	High
El Paso County	Likely	Limited	Limited	Moderate	Minor	Moderate
Fountain	Likely	Minor	Negligible	Moderate	Minor	Low
Green Mtn Falls	Unlikely	Minor	Negligible	Moderate	Negligible	Low
Manitou Springs	Likely	Limited	Limited	Moderate	Minor	Moderate
Monument	Unlikely	Minor	Negligible	Moderate	Negligible	Low
Palmer Lake	Unlikely	NA	Negligible	NA	Negligible	Negligible
Ramah	Unlikely	NA	Negligible	NA	Negligible	Negligible
Regionwide	Likely	Limited	Limited	Moderate	Minor	Low

Spatial Extent and Geographic Location

Landslides and rockfalls can occur anywhere there are unstable slopes, vulnerable underlying bedrock, or other conditions leading to slope instability. The best available predictor of where movement of slides and earth flows might occur is the location of past movements. Past slides can be recognized by their distinctive topographic shape, which can remain in place for thousands of years. The recognition of ancient dormant mass movement sites is important in the identification of areas susceptible to flows and slides because they can be reactivated by earthquakes or by exceptionally wet weather. Also, because they consist of broken materials and frequently involve disruption of groundwater flow, these dormant sites are vulnerable to construction-triggered sliding.

According to the State of Colorado Hazard Mitigation Plan, “Many of Colorado’s landslides occur along transportation networks because soil and rock along the transportation corridor has been disturbed by roadway construction. Construction along roads can occur with or without proper landslide hazard mitigation procedures” (Colorado Division of Emergency Management, 2018).

The areas susceptible to landslides and rockfall in El Paso County and the participating jurisdictions are shown in Figure 4-53 and Figure 4-54, respectively.

Figure 4-53: Landslide & Rockfall Susceptibility Areas, Pikes Peak Region

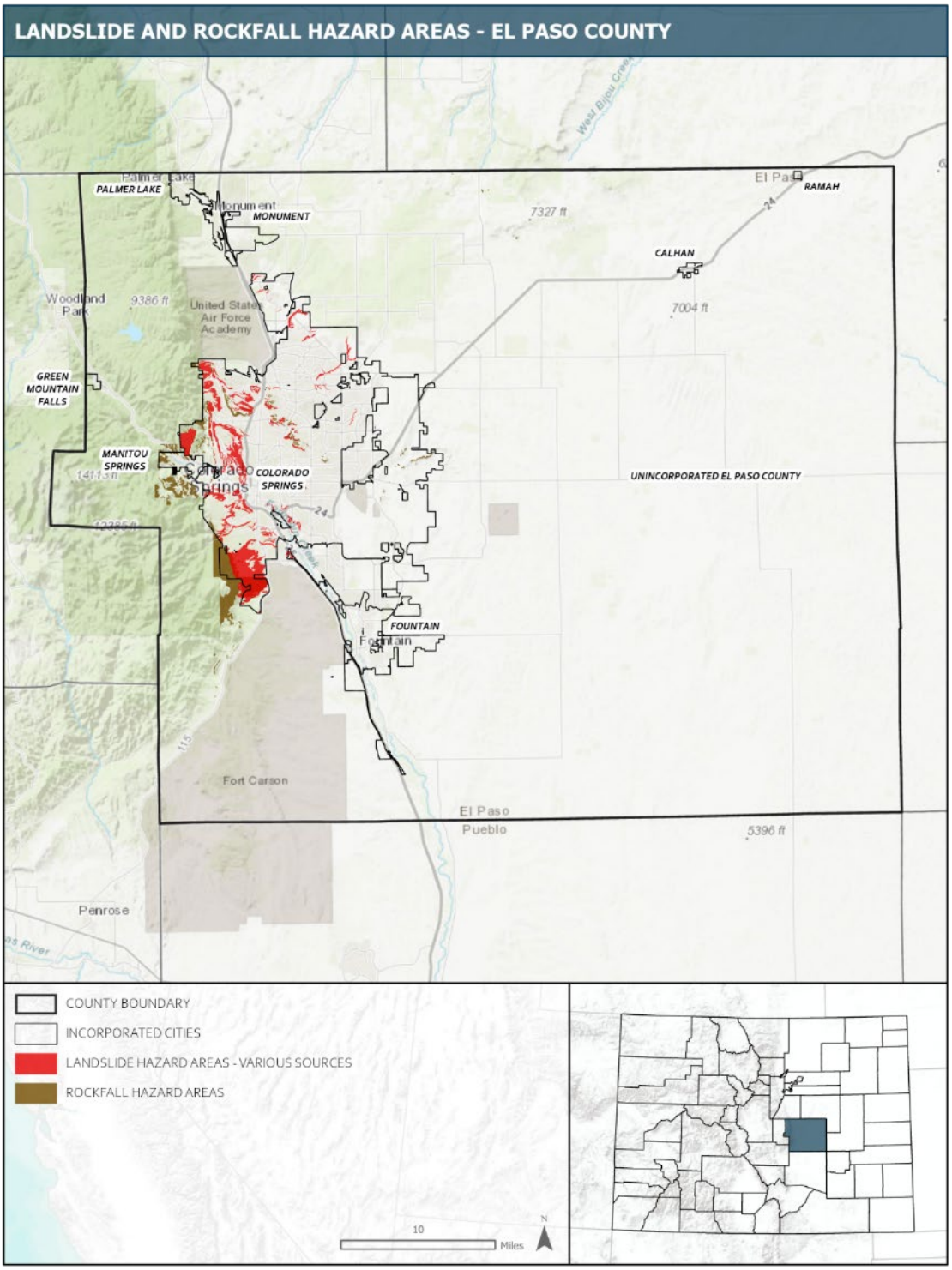


Figure 4-54: Landslide & Rockfall Susceptibility Areas, Participating Jurisdictions

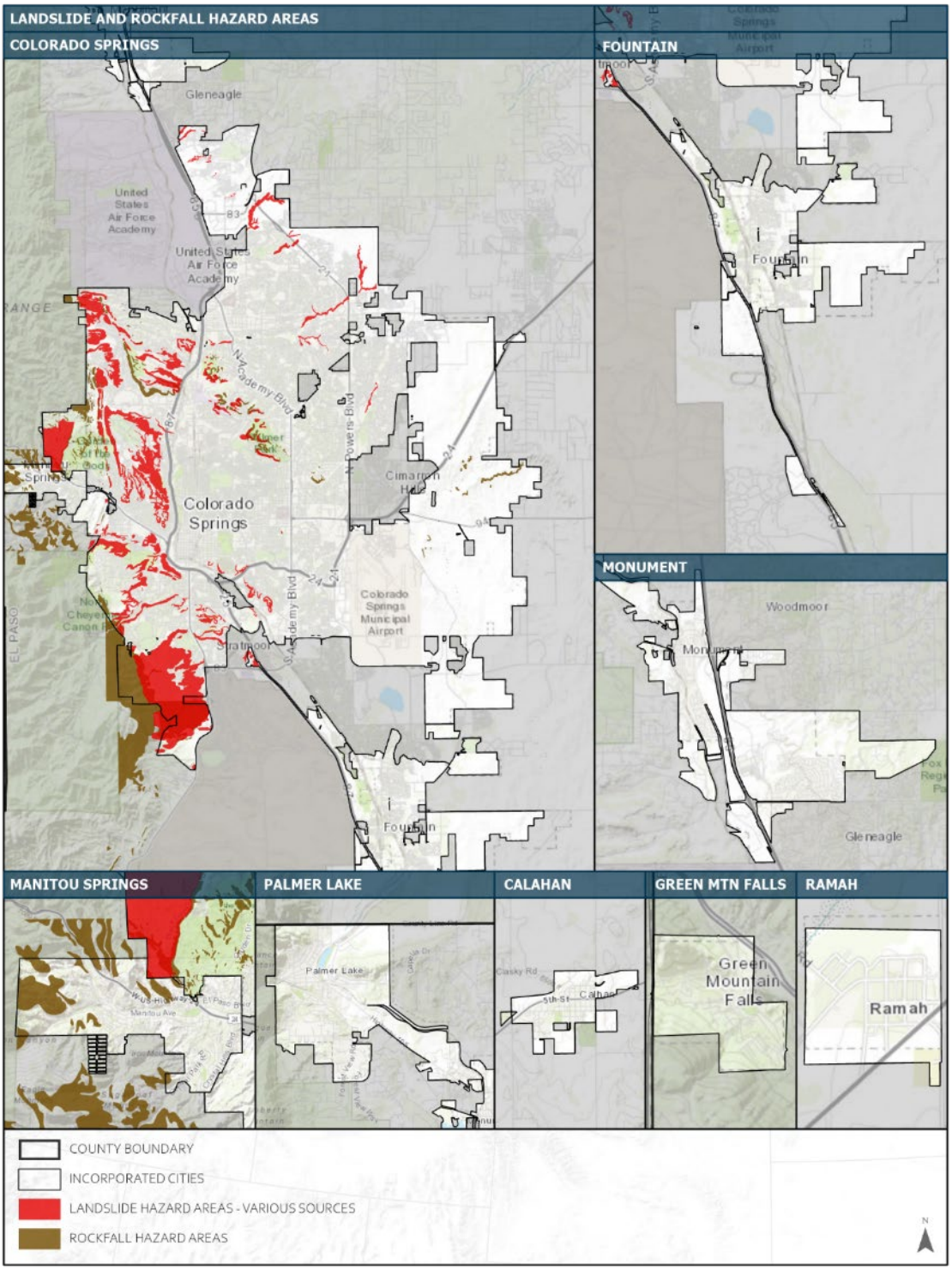


Table 4-61 identifies the acreage and percent of area within each jurisdiction exposed to landslide and rockfall susceptibility areas. Only those jurisdictions with exposure are included in the table.

Table 4-61: Acreage and Percent of Area Within Each Jurisdiction Exposed to Landslide and Rockfall Susceptibility Areas

Jurisdiction	Total Exposed Area (Acres)	Total Exposed Area (%)
Colorado Springs	34,374	27%
El Paso County	22,310	2%
Fountain	96	0.7%
Manitou Springs	486	24%
Regionwide	**57,266**	**4%**

An article published by *The Gazette* describes "Western Colorado Springs as landslide territory. Maps from CGS place all of the neighborhoods between Cheyenne Mountain and Fort Carson in landslide zones, in addition to areas in Manitou Springs, Mountain Shadows and near Ute Valley Park. West of U.S. Highway 24, landslide zones cover Cascade and neighborhoods across the highway from Green Mountain Falls" (Handy, 2015).

Probability of Future Occurrence

Likely: 25 to 75 percent annual probability (Colorado Springs, El Paso County, Fountain, and Manitou Springs)

Unlikely: Less than 1 percent annual probability (Calhan, Green Mountain Falls, Monument, Palmer Lake, Ramah)

Historical data suggests that a major landslide or rockfall event may occur in Colorado Springs, El Paso County, Fountain, and Manitou Springs once every couple years. However, several prolonged low intensity sustaining rainstorms may increase slide occurrence.

The 2016 City of Colorado Springs Hazard Mitigation Plan update points out that the City has completed several programs for mitigation of landslides; thus, decreasing the likelihood that an event would occur or result in the historical damage previously documented. Amongst other mitigation efforts, since 1996 the City has required builders to test building sites for landslide potential.

Magnitude / Severity

Landslides and rockfalls destroy property and infrastructure and can take the lives of people. Slope failures in the United States result in an average of 25 to 50 lives lost per year and an annual cost to society of about $1.5 billion. Rockfalls can travel at 60 feet per second or more and even small rocks can instantly kill (Colorado Geological Society, 2008). The magnitude/severity of a landslide/rockfall event in Colorado Springs is **Critical**. It is likely that events can result in isolated deaths and/or multiple injuries as well as major or long-term property damage that threatens structural stability; and/or interruption of essential facilities for 24-72 hours. However, these impacts are highly localized, so the overall significance to the

County and to the participating jurisdictions that are not near landslide-prone areas (for example the towns of Calhan and Ramah) is considered **limited**: low potential impact.

Warning Time

Landslide warning time is highly dependent upon the type of slide and the trigger, if any. Mass movements can occur suddenly or slowly. The velocity of movement may range from a slow creep of inches per year to many feet per second, depending on slope angle, material and water content. Some methods used to monitor mass movements can provide an idea of the type of movement and the amount of time prior to failure. It is also possible to determine what areas are at risk during general time periods. Assessing the geology, vegetation and amount of predicted precipitation for an area can help in these predictions. However, there is no practical warning system for individual landslides. The current standard operating procedure is to monitor situations on a case-by-case basis, and respond after the event has occurred. Generally accepted warning signs for landslide activity include:

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements or sidewalks
- Soil moving away from foundations
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house
- Tilting or cracking of concrete floors and foundations
- Broken water lines and other underground utilities
- Leaning telephone poles, trees, retaining walls or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased soil content
- Sudden decrease in creek water levels though rain is still falling or just recently stopped
- Sticking doors and windows and visible gaps indicating jambs and frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together.

Exposure and Losses

➢ Property

Property located near steep slopes or downslope from wildfire burn scars is exposed to landslide and rock fall hazards. All property exposed to the landslide and rockfall hazard is vulnerable. Structural damage can range from minor damage to total destruction. Damage to structures in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction.

There are 5,922 structures within the identified landslide and rockfall susceptibility areas defined in Figure 4-53: Map of Potential Areas of Landslide and Rockfall Susceptibility in the County. Of the structures identified as susceptible, 96% are within the City of Colorado Springs. The number of exposed structures and potential cost of damage is shown in Table 4-62. Only those jurisdictions with exposure are included in the table.

Table 4-62: Structure Exposure Within Identified Landslide and Rockfall Susceptibility Areas

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Exposed Structure Market Valuation ($)			
			10% Damage	30% Damage	50% Damage	100% Damage
Colorado Springs	5,668	4%	$272,975,792	$818,927,377	$1,364,878,962	$2,729,757,924
El Paso County	251	0.3%	5328995	$15,986,985	$26,644,976	$53,289,951
Manitou Springs	3	0.1%	$206,565	$619,694	$1,032,823	$2,065,646
Regionwide	**5,922**	**2.6%**	**$278,511,352**	**$835,534,056**	**$1,392,556,760**	**$2,785,113,521**

➢ Population

People living or working near steep slopes are exposed to landslide and rockfall hazards. Individuals travelling on roads that cut through mountainous terrain or recreating in such areas are also exposed. Residents living downslope of wildfire burn scars are also exposed to landslide and rockfall hazards.

All persons exposed to landslide and rockfall hazards are vulnerable. Populations with mobility issues, the elderly and young populations may be more vulnerable as there is usually little warning for such events and these individuals may have difficulty moving out of the path of a slide or fall. Table 4-63 identifies the number of people residing in landslide and rockfall susceptibility areas by jurisdiction. Only jurisdictions with exposure are included.

Table 4-63: Population Within Landslide and Rockfall Susceptibility Areas

	Total Exposed Population Count	Total Exposed Population (%)
Colorado Springs	16,569	4%
El Paso County	396	0.3%
Manitou Springs	8	0.2%
Regionwide	**16,973**	**3%**

➢ Environment

Environmental problems as a result of mass movements can be numerous. Landslides that fall into streams may significantly impact fish and wildlife habitat, as well as affecting water quality. Hillsides that provide wildlife habitat can be lost for prolonged periods of time due to landslides.

➢ Critical Facilities and Infrastructure

Several types of infrastructure are exposed to mass movements, including transportation, water, and sewer, communication, and power infrastructure. Highly susceptible areas of the county include mountain roads and transportation infrastructure.

- **Roads**—Landslides can block egress and ingress on roads, causing isolation for neighborhoods, traffic problems and delays for public and private transportation. This can

result in economic losses for businesses. The Colorado Department of Transportation CDOT) has a rockfall program that identifies, assesses, and mitigates rock fall hazards along Colorado's state highways. CDOT employs a rock fall rating scheme to prioritize areas for mitigation.

- **Bridges**—Landslides can significantly impact road bridges. Mass movements can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use.
- **Power Lines**—Power lines are generally elevated above steep slopes; the towers supporting them can be subject to landslides. A landslide could trigger failure of the soil underneath a tower, causing it to collapse and ripping down the lines. Power and communication failures due to landslides can create problems for vulnerable populations and businesses.
- **Water Supply and Distribution Systems**—Large amounts of debris that wash into streams can clog reservoirs, pipelines, or treatment facilities.
- **Railroad** - Landslide events occurring on, or near, railways have the potential to significantly impact rail transportation in Colorado, as there is no cost-effective way of routing railroads around landslides, especially rockfall.

4.9.3.4 Consequence Analysis

Landslide / Rockfall Consequence Analysis	
Category	**Narrative**
Hazard Description	Landslides and rockfalls can occur anywhere there are unstable slopes, vulnerable underlying bedrock, or other conditions leading to slope instability. Areas with the greatest rockfall/landslide susceptibility are generally confined to the western half of the region near the foothills and/or other steep, mountainous terrain. Landslide and rockfall as the original event can trigger secondary or cascading impacts that exacerbate risk from other hazards. As described in the Colorado SEOP, a landslide near a dam could trigger a dam failure. It can also trigger a flood by damming a water source or subsidence. A landslide could also trigger a transportation problem and a utility disruption.
Impact to Property, Facilities, and Infrastructure	Major or long-term property damage that threatens structural stability. There are 5,922 structures within the identified landslide and rockfall susceptibility areas. Landslides and slope failures in the past have caused major structural damage to homes and businesses. A significant landslide could not only demolish the above ground facilities and infrastructure, but also wreak havoc on underlying utilities (gas, electric, water, etc.). In addition to the initial damage and disruption caused by landslides and rockfall, they can also impart additional damage and hinder recovery and rebuilding efforts. Any land movement can also trigger a HAZMAT incident by damage to the HAZMAT facility or utility infrastructure such as natural gas lines or sewage infrastructure. It

	can also cause mass casualties and impact transportation, trigger urban fires, and cause utility disruption.
Impact on the Environment	Landslides that fall into streams may significantly impact fish and wildlife habitat, as well as affecting water quality. Hillsides that provide wildlife habitat can be lost for prolonged periods of time due to landslides.
Impact on Responders	Damaged roadways and stalled vehicles would impede the ability of responders to navigate roadways in the affected areas. The sheer number of response requests could rapidly overwhelm the ability of local emergency services to respond and require requests for assistance from neighboring jurisdictions. Need for evacuation support such as door-to-door notification and traffic management may increase responder risk; potential impacts to communications lines may affect ability to effectively respond. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by damaged roadways.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Interruption of essential facilities and services less than 24 hours. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from landslide events.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses. Landslides and slope failures in the past have caused major structural damage to homes and businesses. A significant landslide could not only demolish the above ground structures, but also wreak havoc on underlying utilities (gas, electric, water, etc.), and cause personal harm and/or death should these events occur quickly without warning.
Impact on the Economic Condition of the County	Limited workforce and loss of businesses and tourism could impact the local economy.
Impact on the Public Confidence in Government	Duration of response and repair to closed or blocked roadways is a visible and often reported in the media which may lead to public perceptions of capability. Confidence is highly dependent on the public's perception on how well response and recovery are handled during and after an event. Notification/communication with people, especially of vulnerable populations, is important.

4.9.3.5 Secondary Hazards

Landslides can cause several types of secondary effects, such as blocking access to roads, which can isolate residents and businesses and delay commercial, public and private transportation. This could result in economic losses for businesses. Other potential problems resulting from landslides are power and communication failures. Vegetation or poles on slopes can be knocked over, resulting in possible losses

to power and communication lines. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. They also can damage rivers or streams, potentially harming water quality, fisheries, and spawning habitat.

4.9.3.6 Future Condition Impacts

The County is experiencing significant growth and this growth is expected to continue in the coming decades. More development in the County may increase the number of persons and structures exposed to landslide and rockfall hazards. Future climate conditions are also a critical consideration. "Climate change and rising temperatures are expected to trigger more landslides, especially in mountainous areas with snow and ice (World Health Organization, 2020)." Land use planning and permit authorization conducted by the County and incorporated areas can be used to guide development away from slide and fall prone areas.

In western Colorado Springs, development has occurred in many of the hillside sloped areas over the past 25 years. Intense cut and fill and an increase in lawn irrigation has led to a rise in subsurface water levels. This has resulted in marginally stable slopes becoming even less stable, and more sensitive to significant precipitation events.

The City of Colorado Springs has established overlays to regulate hillside development in areas with unstable or potentially unstable slopes, areas with previous mining activity, or areas that exhibit other geologic hazards that could potentially compromise structures. These overlays exceed the typical development review process in order to proactively reduce the effects of landslides on development. In addition, in 1996, the City of Colorado Springs passed a Geologic Hazard Ordinance that requires a geologic hazard study in conjunction with the City's review of development proposals in the hillside area overlay zone. These required studies identify the hazards affecting a site, analyze potentially negative impacts, and suggest mitigation techniques thus minimizing the risk posed to the development by any identified geologic hazards.

The City of Colorado Springs has also developed, and made available to the public, interactive landslide and rockfall susceptibility maps. The maps are accessible from the City's website: https://coloradosprings.gov/pikes-peak-regional-emergency-management-colorado-springs/page/landslide. The landslide and rockfall susceptibility maps can be utilized during resource development planning, in land use and development planning, and in infrastructure planning projects such as roads, railways, pipelines, and transmission lines (Mowen, et. al., 2004). Further, the City instituted a property acquisition program for homes affected by the 2015 landslides. Thereby, decreasing the likelihood that an event would occur or result in the historical damage previously documented

4.9.3.7 Issues

Important issues associated with landslides and rockfall in the planning area include the following:

- There are existing homes in landslide risk areas throughout the County. The degree of vulnerability of these structures depends on the codes and standards the structures were constructed to. Information to this level of detail is limited.

- As incidents of wildfires increase and hillsides are void of vegetation, rain-soaked hillsides are more likely to slide resulting in increased damage countywide.
- Future development could lead to more homes in landslide/rockfall risk areas.
- Mapping and assessment of landslide hazards are constantly evolving. As new data and science become available, assessments of landslide/rockfall risk should be reevaluated.
- Landslides/rockfalls may cause negative environmental consequences, including water quality degradation.
- The risk associated with the landslide or rockfall hazard overlaps the risk associated with other hazards such as earthquake, flood, and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.
- Any structure is vulnerable to landslide or rockfall, particularly structures built in foothills areas or below burn scars.
- The greatest infrastructure risk is to Highway 24 through Ute Pass. Any closure of Highway 24 has large economic impacts.
- Many homeowners are not aware that they reside in areas with landslide/rockfall hazards. Outreach to educate and increase public awareness is recommended.

4.10 WILDFIRE

4.10.1.1 Definition and Extent

The Colorado Wildfire Mitigation Plan defines wildland fire as an unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

Fire hazards present a considerable risk to vegetation and wildlife habitats. Short-term losses caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Vulnerability to flooding increases based on the destruction of watersheds. The potential for significant damage to life and property exists in areas designated as wildland urban interface (WUI) areas, where development is adjacent to densely vegetated areas.

DEFINITIONS

Wildfire: Fires that result in uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas. Because of their distance from firefighting resources, they can be difficult to contain and can cause a great deal of destruction.

Wildland Urban Interface (WUI): Widely used within the wildland fire management community to describe any area where structures and other development meet and intermingle with undeveloped wildland and/or vegetative fuels.

Wildfire Risk: The product of the likelihood of a fire occurring (likelihood), the associated fire behavior when a fire occurs (intensity), and the effects of the fire (susceptibility) on highly valued resources and assets.

Fuel: Consists of combustible material, including vegetation, such as grass, leaves, ground litter, plants shrubs, and trees that feed a fire.

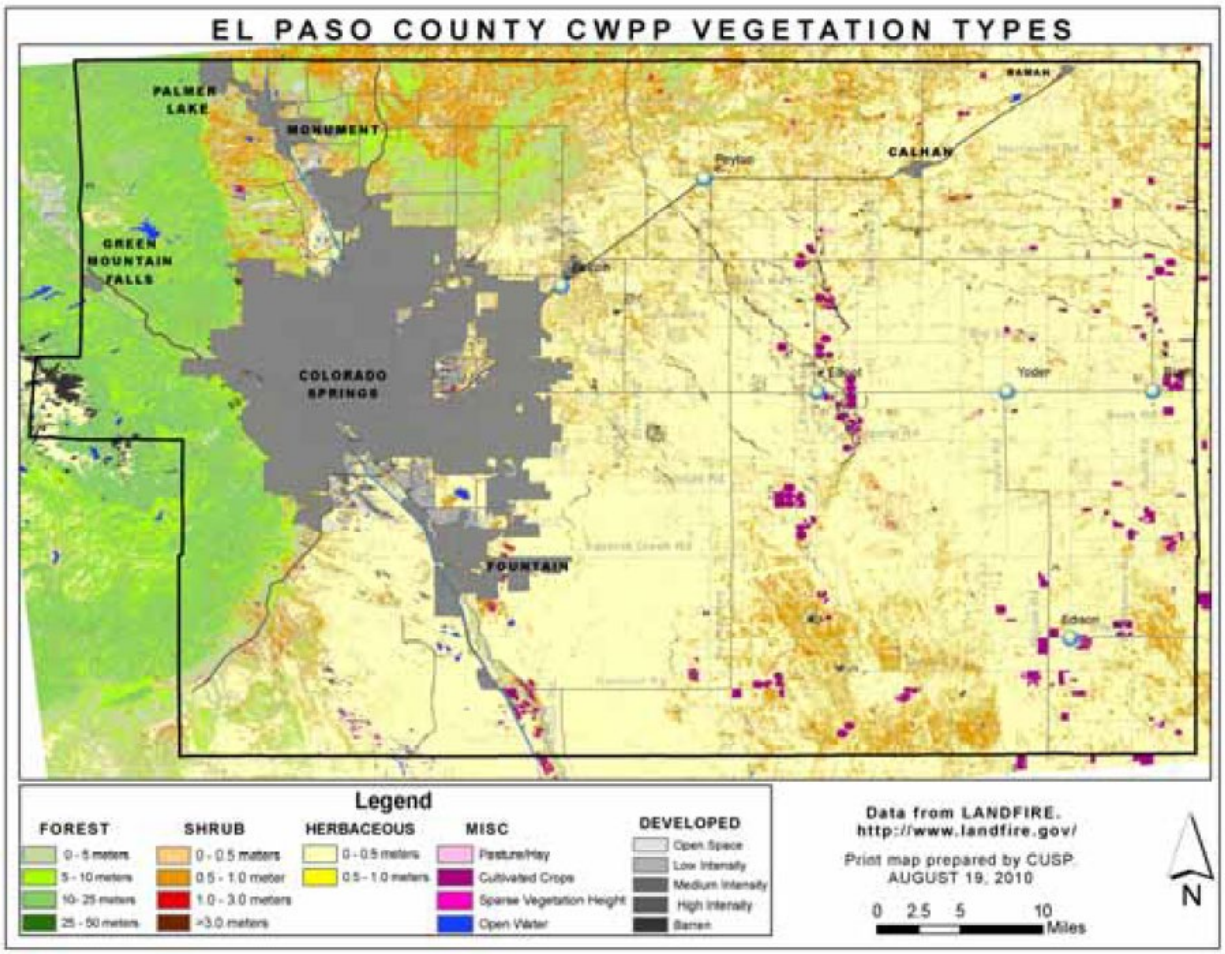
Wildfires are of significant concern throughout Colorado. According to the Colorado State Forest Service, vegetation fires occur on an annual basis; most are controlled and contained early with limited damage. For those ignitions that are not readily contained and become wildfires, damage can be extensive. According to the State of Colorado Natural Hazards Mitigation Plan, a century of aggressive fire suppression combined with cycles of drought and changing land management practices has left many of Colorado's forests, including those in El Paso County, unnaturally dense and ready to burn. Further, the threat of wildfire and potential losses are constantly increasing as human development and population increases and the wildland-urban interface expands. Another contributing factor to fuel loads in the forest are standing trees killed by pine bark beetles, which have been affecting the forests of Colorado since 2002, and are becoming more widespread and a serious concern. According to a hazard risk prioritization survey conducted at the February 25, 2020 LPC Kick-off Meeting, the Committee identified wildfire as the greatest threat to Pikes Peak Region (see Appendix B).

Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in air and fuel. These conditions, especially when combined with high winds and years of drought, increase the potential for wildfire to occur. There are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather.

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Manmade structures, such as homes and associated combustibles, are also considered a fuel source. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for the spread of fire. In addition, "ladder fuels" can spread a ground fire up through brush into trees, leading to a devastating crown fire that burns in the upper canopy and cannot be controlled.

As shown in the El Paso County CWPP Vegetation Types Map, Figure 4-55, El Paso County has two primary types of fuel hazards: grasslands and forests. The County's fuel types follow its topography: in the eastern half, with its relatively flat terrain, mostly grasses and shrubs predominate. In the western portion, where foothills rise steeply, thick coniferous forests are typical. The CWPP describes the dense forests of the western County as providing the heavy fuel loads that can sustain intense fires, and to complicate matters, thousands of homes are located in these forests, often on steep slopes, accessed by narrow roads.

Figure 4-55: El Paso County CWPP Vegetation Types



Source: El Paso County CWPP

Topography, or an area's terrain and land slopes, affects its susceptibility to wildfire spread. Due to the tendency of heat from a fire to rise via convection, both fire intensity and rate of spread increases as slope increases. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

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

According to the El Paso County CWPP, local fire season generally runs from spring to autumn. However, wildfires can and do occur during winter months, especially during mild, dry winters. Even during winters with normal precipitation, Chinook winds can reduce snow cover, dry fuels and create higher fire danger.

The Colorado State Hazard Mitigation Plan describes protecting the WUI as the nation's fastest-growing firefighting expense. In 2015, the USDA projected that fighting wildfires will account for 67 percent of the Forest Service's annual budget by 2025. Protecting life and property in these areas is costly because fire managers must take an aggressive stand on the ground and from the air.

Community Wildfire Protection Plans

Community Wildfire Protection Plans (CWPP) are authorized and defined as part of the Healthy Forests Restoration Act passed by Congress and signed into law in 2003. These plans are intended to bring together diverse local interests to discuss mutual concerns for public safety, community sustainability and natural resources (Colorado State University, no date). Colorado Senate Bill 09-001 requires each county in the state to prepare a CWPP for the unincorporated portion of the county.

According to the list maintained by Colorado State University, there are nineteen communities in El Paso County who have developed Community Wildfire Protection Plans (these plans are available for download at https://csfs.colostate.edu/wildfire-mitigation/community-wildfire-protection-plans/#e):

- El Paso County (2011)
- Apex Ranch Estates (2019)
- Black Forest (2016)
- Carroll Lakes (2014)
- City of Colorado Springs (2011)
- City of Manitou Springs (2019)
- Crystal Park (2013)
- Donald Wescott Fire Protection District (2011)
- Falcon Fire Department (2016)
- Higby Estates (2019)
- High Forest Ranch (2014)
- Mt Herman (2015)
- Palmer Lake (2008)
- Red Rock Ranch (2018)
- Southwestern Highway 115 Fire Protection District (2007)
- Spirit Lakes (2014)

- Ute Pass (2007)
- Wissler Ranch (2010)
- Woodmoor (2017)

4.10.1.2 Previous Occurrences

Although the Pikes Peak Region has a long history of wildland fires, over the last several decades, the region has experienced an upswing in multiple large and erratic fires (shown in Table 4-64). The Manitou Springs CWPP describes the changing conditions, stating: "Historically, large, catastrophic wildland fires were infrequent. Low intensity fires were common and a part of nature that promoted healthy forests and grasslands. With the spread of human development into the wildland areas, the once innocuous, low intensity fires have become a potential for catastrophe (City of Manitou Springs CWPP, 2019)." The increasing number, magnitude, and impact of fires are the result of several factors, including expansion of the wildland-urban interface, prolonged droughts resulting in extremely dry and volatile fuels, a decline in forest health, and an abundance of fuel due to fire suppression.

Table 4-64: Average Number of Wildfires by Decade

Decade	Number of fires greater than 10 acres	Number of Acres Burned
1980-1989	2	310-1100*
1990-1999	4	40-400*
2000-2009	10	38,694
2010-2019	3	73,189
*Exact fire size not available before 2000		

Table 4-65 presents a list of significant wildfire events that have taken place in El Paso County between 1985 and 2019. The historic fire perimeters are shown in Figure 4-58.

Table 4-65: Wildfires in El Paso County, 1985-2019 (Greater Than 10 Acres)

Year	Fire Name / ID	Reported Size (acres)	Source
1985	000030	10-100*	Federal Fire Occurrence Website
1989	000007	300-1000*	Federal Fire Occurrence Website
1992	000008	10-100*	Federal Fire Occurrence Website
1992	000012	10-100*	Federal Fire Occurrence Website
1997	Stanley	10-100*	Federal Fire Occurrence Website
1998	Mays Peak	10-100*	Federal Fire Occurrence Website
2000	Unnamed	1359	CO-Wrap
2002	Unnamed	1612	CO-Wrap
2002	Unnamed	4903	CO-Wrap
2002	Unnamed	6567	CO-Wrap

2002	Unnamed	2199	CO-Wrap
2002	Unnamed	2386	CO-Wrap
2002	Unnamed	1366	CO-Wrap
2002	Unnamed	4910	CO-Wrap
2008	TA-25	8252	CO-Wrap
2009	Quarry	5140	CO-Wrap
2012	Waldo Canyon	18259	CO-Wrap
2013	Black Forest	13119	CO-Wrap
2018	MM 117	41811	CO-Wrap
*Exact fire size not reported before 2000			

Colorado's 2018 wildfire season was one of the worst on record, with five of its fires making the list of the top 20 largest in state history. In April of 2018, El Paso County experienced one of those record setting fires, recording the ninth largest fire in state history. The MM 117 Fire, named after its point of origin near mile marker 117 on Interstate 25, burned more than 40,000 acres in El Paso and Pueblo counties, and is responsible for destroying more than 20 homes and causing evacuation of nearly 400 homes.

Figure 4-56: Black Forest Fire, 2013

Source: El Paso County OEM

Only a few years prior to the MM 117 Fire, two of the largest wildfires in El Paso County history struck in consecutive years: the Waldo Canyon fire in 2012 and the Black Forest fire in 2013 (see Figure 4-56). Both of these fires were the most destructive fires in Colorado State history at the time of their occurrence and both received presidential disaster declarations. The Waldo Canyon Fire started in U.S. Forestland west of Colorado Springs whereas the Black Forest fire hit north of Colorado Springs mostly in privately owned land.

The Waldo Canyon fire started approximately 4 miles northwest of Colorado Springs on June 23, 2012. The fire was active in the Pike National Forest and adjoining areas, covering a total of 18,247 acres. The fire caused the evacuation of over 32,000 residents of Colorado Springs, Manitou Springs, and Woodland Park, several small mountain communities along the southwestern side of Highway 24, and partial evacuation of the United States Air Force Academy. Approximately 346 homes were destroyed by the fire. U.S. Highway 24, a major east-west road, was closed in both directions. The Waldo Canyon fire resulted

in insurance claims totaling more than $453.7 million. At the time it was the most destructive fire in Colorado state history, as measured by the number of homes destroyed, until the Black Forest fire surpassed it almost a year later.

The Black Forest fire began on June 11, 2013. Windy conditions on the first day caused the fire to spread rapidly. Several thousand residents were evacuated, and the fire consumed 511 homes and damaged 28 others. There were two fatalities as a result of the fire. The fire was fully contained on June 20, 2013 after burning more than 14,000 acres. The 2018 Colorado State Hazard Mitigation Plan describe losses to the utilities and County totaling approximately $12 million. Utility damage included poles, transformers, and wires, while damaged or destroyed property of El Paso County included roadway, guardrail, culverts, road signs, fencing, and storage facilities.

4.10.1.3 Vulnerability

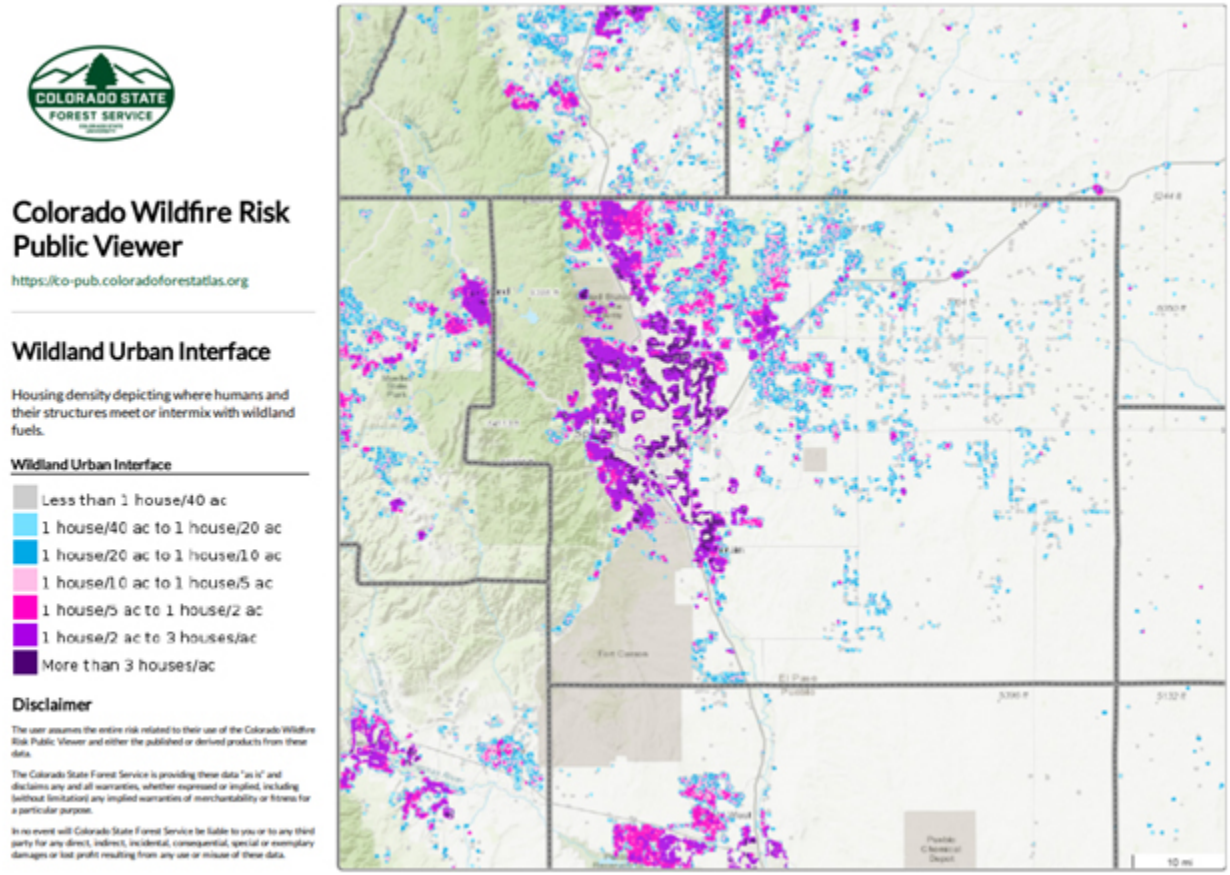
Table 4-66: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Likely	Minor	Limited	Significant	Minor	Low
Colorado Springs	Likely	Critical	Limited	Significant	Minor	High
El Paso County	Likely	Catastrophic	Moderate	Significant	Moderate	High
Fountain	Likely	Critical	Moderate	Significant	Minor	Moderate
Green Mtn Falls	Likely	Catastrophic	Significant	Significant	Severe	High
Manitou Springs	Likely	Critical	Moderate	Significant	Severe	High
Monument	Likely	Critical	Moderate	Significant	Severe	High
Palmer Lake	Likely	Critical	Moderate	Significant	Severe	High
Ramah	Likely	Minor	Negligible	Significant	Minor	Low
Regionwide	Likely	Critical	Moderate	Significant	Moderate	High

Spatial Extent and Geographic Location

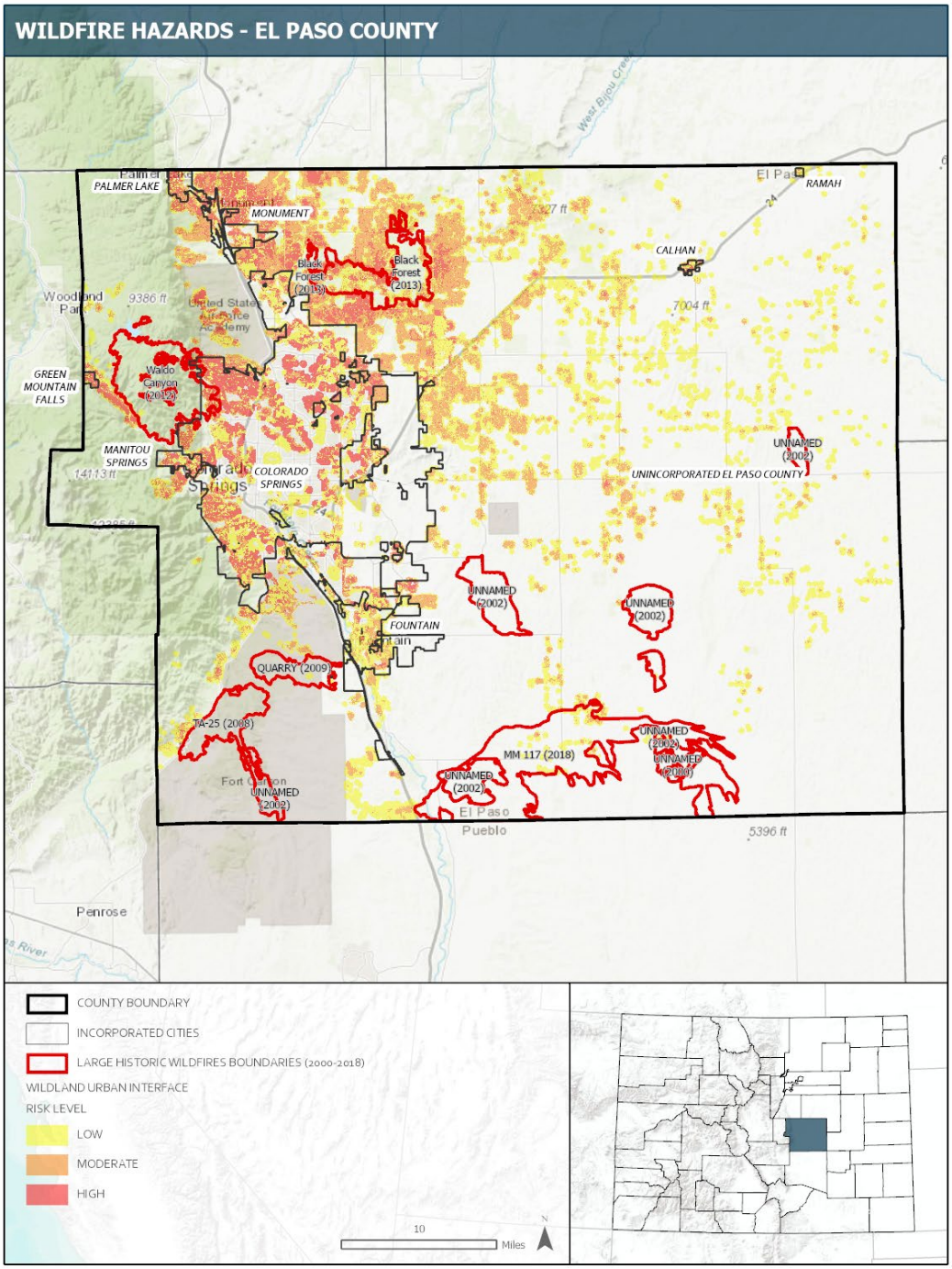
El Paso County continues to lead the state in population growth, and much of this growth is occurring in the WUI area, where structures and other human improvements meet and mix with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk from wildfires. For El Paso County, the Colorado – Wildfire Risk Assessment Portal (CO-WRAP) estimates that 58 percent of the County population lives within the WUI and is at risk from wildfire. Figure 4-57 shows the El Paso County housing density within the WUI.

Figure 4-57: Wildland urban interface



The CO-WRAP report for El Paso County maps the Wildland-Urban Interface Risk Index, which is a rating of the potential impact of a wildfire on people and their homes. The key input reflects housing density (Figure 4-57). The CO-WRAP report states that the location of people living in the WUI and rural areas is essential for defining potential wildfire impacts to people and homes. Figure 4-58 shows the Wildland Urban Interface Risk Index for El Paso County.

Figure 4-58: Wildland Urban Interface Risk Index



According to the CO-WRAP report for El Paso County, wildfire risk represents the possibility of loss or harm occurring from a wildfire. Wildfire Risk is a composite risk map created by combining the Values at Risk Rating and the Burn Probability layers. It identifies areas with the greatest potential impacts from a wildfire. Wildfire risk is comprised of several individual risk layers including Wildland Urban Interface

(housing density), Forest Assets, Riparian Assets and Drinking Water Importance Areas risk outputs. The WUI component is a key element of the composite risk since it represents where people live in the wildland and urban fringe areas that are susceptible to wildfires and damages. The four individual risk layers are weighted to derive the Values at Risk Rating layer. Figure 4-59 shows the wildfire risks for areas within El Paso County, Table 4-67 reflects the acreage and percent of area in each jurisdiction exposed to moderate to very high wildfire risk.

Figure 4-59: Wildfire Risk

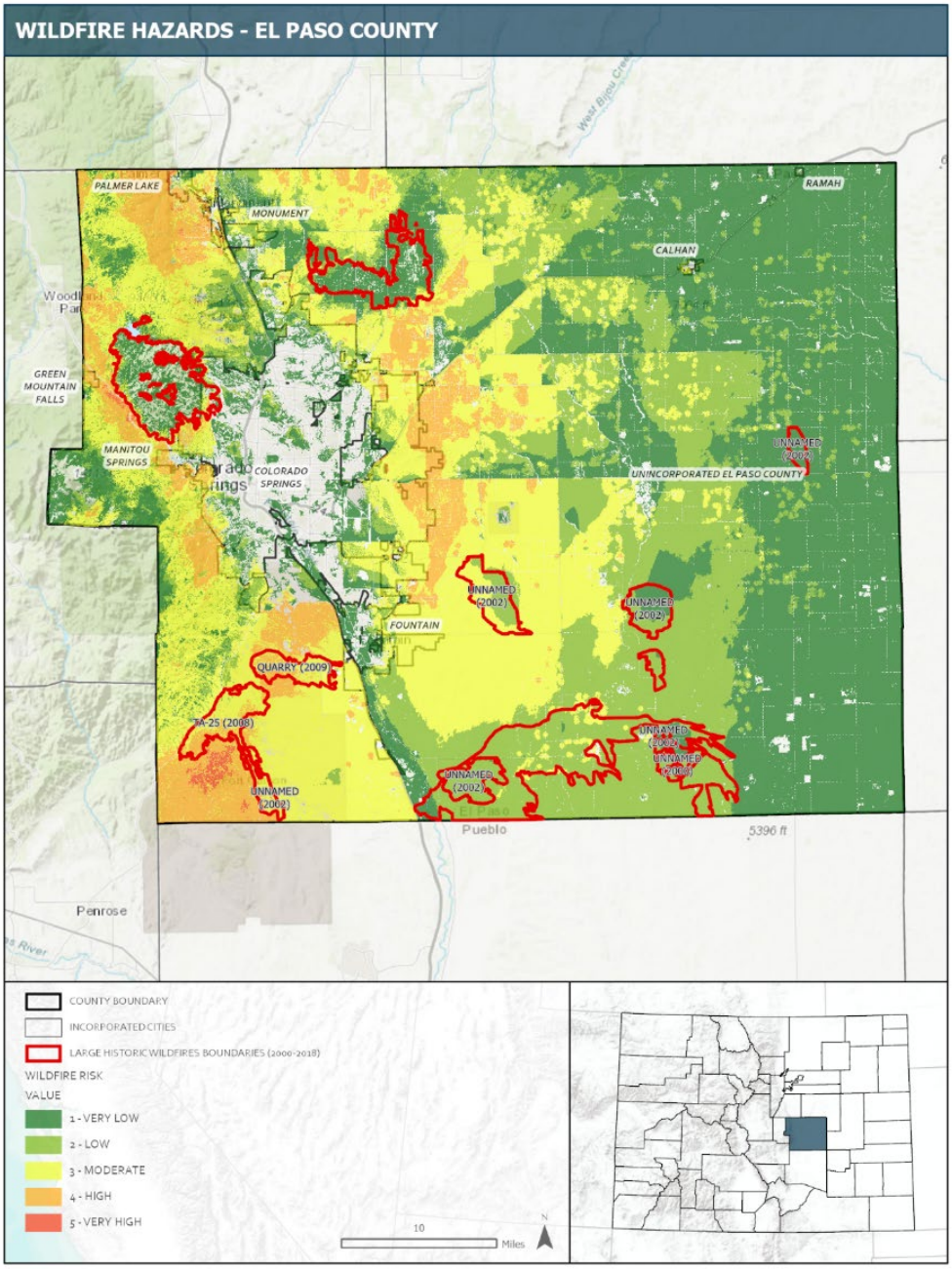


Table 4-67: Acres and Percent of Area Exposed to Moderate to Very High Wildfire Risk

Jurisdiction	Total Area Exposed (Acres)	Total Area Exposed (%)
Calhan	64	10%
Colorado Springs	29,440	24%
El Paso County	378,880	31%
Fountain	5,632	40%
Green Mountain Falls	448	92%
Manitou Springs	704	36%
Monument	1,472	33%
Palmer Lake	960	48%
Ramah	0	0%
Regionwide	**417,600**	**31%**

Probability of Future Occurrence

Likely: 25 to 75 percent annual probability of a significant fire (10+ acres) occurring. The probability of small fires is highly likely and is expected to occur multiple times per year. The Colorado State Wildfire Risk Assessment Report for El Paso County indicates that there is a 100-percent chance that at least one wildfire will occur each year in El Paso County. However, many of these fires will be 5 acres and less. Larger fires, over 10 acres, are likely to occur every few years based on historic fire events in El Paso County. However, the frequency of large fires is expected to be up to six times as likely by mid-century (2041-2070) compared to the past (1971-2000). This is due to limited fuels reduction and forest management, and the effects of climate change that may intensify fire-friendly weather conditions, as well as lengthen the season during which very large fires tend to spread (Kennedy, 2015).

Magnitude / Severity

The wildfire hazard for the County is considered to be **critical**: isolated deaths or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and interruption of essential facilities and services for 24 to 72 hours. It is possible that a wildfire event in the County could be **catastrophic**: extraordinary levels of mass causalities, damage or disruption severely affecting the population, infrastructure, environment, economy, and government functions, which includes sustained city and regional impacts; overwhelms the existing response strategies and state and local resources; and requires significant out-of-state and federal resources. The City of Colorado Springs, with over 400,000 citizens, would suffer catastrophic damages due to the high density of structures throughout city limits.

Warning Time

Significant: Warning time is typically 12 to 24 hours. Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Since fireworks often cause brush fires, extra diligence is warranted around the Fourth of July when the use of fireworks is highest. Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildfires. Severe weather can be predicted, so special attention can be paid during weather events that may include

lightning. The high speed of wind driven grass fires often leaves little or no time for public warnings or orderly evacuation. In contrast, fires in forests typically do not move and change direction as quickly as wind-driven grass fires, though under the right conditions they can move at great speed.

Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm. If a fire does break out and spread rapidly, residents may need to evacuate within days or hours. A fire's peak burning period generally is between 1 p.m. and 6 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications in recent years has further contributed to a significant improvement in warning time.

Exposure and Losses

➢ Property

Property damage from wildfires can be severe and can significantly alter entire communities. Loss estimations for the wildfire hazard are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent, 50 percent and 100 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 4-68 lists the loss estimates for the general building stock for jurisdictions that have an exposure to moderate to very high wildfire risk areas.

Table 4-68: Loss Estimates for the General Building Stock for Jurisdictions that have an Exposure to Moderate to Very High Wildfire Risk Areas

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Estimated Loss Potential			
			10% Damage	30% Damage	50% Damage	100% Damage
Calhan	16	3%	$273,078	$819,234	$1,365,391	$2,730,782
Colorado Springs	1,184	1%	$57,794,070	$173,382,209	$288,970,348	$577,940,696
El Paso County	19,212	26%	$430,319,751	$1,290,959,252	$2,151,598,753	$4,303,197,507
Fountain	227	3%	$5,455,703	$16,367,108	$27,278,513	$54,557,026
Green Mtn Falls	342	91%	$7,339,392	$22,018,176	$36,696,960	$73,393,920
Manitou Springs[1]	119	6%	$5,078,730	$15,236,190	$25,393,650	$50,787,300
Monument	72	3%	$2,287,804	$6,863,413	$11,439,022	$22,878,045
Palmer Lake	311	25%	$11,619,162	$34,857,485	$58,095,808	$116,191,616
Ramah	0	0%	NA	NA	NA	NA

[1] The City of Manitou Springs Community Master Plan & Hazard Mitigation Plan (2017) identifies a larger number of structures exposed to wildfire risk than as reported here. There are several methodologies for analyzing risk due to wildfires; the City of Manitou Springs has applied a different methodology to assess risk and is referencing an earlier dataset (2012) than is used in this Hazard Mitigation Plan Update.

Regionwide	**21,483**	**9%**	**$520,167,689**	**$1,560,503,067**	**$2,600,838,446**	**$5,201,676,892**

➢ Population

Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly, and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, and nitrogen oxides), and toxic substances (formaldehyde, benzene, and others). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildfires include difficulty in breathing, odor, and reduction in visibility.

Wildfires may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

Total population within moderate to very high wildfire risk areas is identified in Table 4-69.

Table 4-69: Population within Moderate to Very High Wildfire Risk Areas

	Exposed Population Count	Exposed Population (%)
Calhan	16	3%
Colorado Springs	2,803	1%
El Paso County	32,760	21%
Fountain	569	2%
Green Mtn Falls	615	92%
Manitou Springs	264	5%
Monument	127	2%
Palmer Lake	650	26%
Ramah	0	0%
Regionwide	**37,804**	**6%**

➢ Environment

Fire is a natural and critical ecosystem process in most terrestrial ecosystems, dictating in part the types, structure, and spatial extent of native vegetation. However, wildfires can cause severe environmental impacts:

- Damaged Fisheries—Critical fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality.
- Soil Erosion—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.

- Spread of Invasive Plant Species—Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control.
- Disease and Insect Infestations—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- Destroyed Endangered Species Habitat—Catastrophic fires can have devastating consequences for endangered species.
- Soil Sterilization—Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost. It can take decades or even centuries for ecosystems to recover from a fire. Some fires burn so hot that they can sterilize the soil.

Many ecosystems are adapted to historical patterns of fire occurrence. These patterns, called "fire regimes," include temporal attributes (e.g., frequency and seasonality), spatial attributes (e.g., size and spatial complexity), and magnitude attributes (e.g., intensity and severity), each of which have ranges of natural variability. Ecosystem stability is threatened when any of the attributes for a given fire regime diverges from its range of natural variability.

➢ Critical Facilities and Infrastructure

In the event of a wildfire, there would likely be little damage to the majority of infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk to wildfire because most are made of wood and susceptible to burning. Also susceptible are communication infrastructure such as telephone cabling and antenna towers. In the event of a wildfire, natural gas pipelines could provide a source of fuel and lead to a catastrophic explosion.

Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. A wildfire typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and in some cases to isolated neighborhoods.

4.10.1.4 Consequence Analysis

Wildfire Consequence Analysis	
Category	**Narrative**
Hazard Description	Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in air and fuel. These conditions, especially when combined with high winds and years of drought, increase the potential for wildfire to occur. There are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather.
Impact to Property, Facilities, and Infrastructure	Major or long-term property damage that threatens structural stability. 58% of the region's population is within the WUI. 21,483 structures are within moderate to very high wildfire risk areas. Wildfires create air pollution, impact roads and bridges, schools, hospitals, directly or indirectly, making access much more difficult. Detours

	and road closures also add to the cost of the fire event. Transportation, communications and the general operation of governmental services may be disrupted by a wildfire incident. In most reported fire incidents, roads and bridges have been reported as the major infrastructure elements impacted.
Impact on the Environment	Significant impact related to loss of forest or grasslands, impacts to water quality, erosion, and sedimentation may affect critical infrastructure and natural waterways. Dead or damaged trees are at risk of falling. Loss of ground vegetation may encourage landslides, mudslides, or other geologic movement of land as was the case with areas downstream of the Waldo Canyon burn scar. Other hazard risks include damage to a HAZMAT facility. It can also impact transportation, trigger urban fires, and cause utility disruption. Habitat destruction would also have a significant effect on the environment.
Impact on Responders	Incident responders face the same threats the general public does, but on a more significant and probable level. In addition, responders can be hurt accessing fires in areas that have rough or steep terrain. The chance for injury, illness and/or death is very high for responders. Other threats to responders may include exhaustion, usually experienced in very large fires that continue for extended periods of time and long-term effects of environmentally caused diseases. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by blocked roadways.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Interruption of essential facilities and services for 12-24 hours. Power interruption is likely if not adequately equipped with backup generators.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses. Potential losses from wildfire include human life; structures and other improvements; natural and cultural resources; the quality and quantity of the water supply; range and crop lands, and economic losses (tourism, fire expenditures, etc.). Smoke and air pollution from wildfires can be a severe health hazard.
Impact on the Economic Condition of the County	Potential losses from wildfire include human life; structures and other improvements; natural and cultural resources; the quality and quantity of the water supply; range and crop lands, and economic losses (tourism, fire expenditures, etc.). Smoke and air pollution from wildfires can be a severe health hazard and may cause reduction in tourism. Depending on the nature of the area where fire occurs, many home-based businesses will be impacted due to evacuation, lack of utility service, or through destruction of property. Other secondary impacts include future flooding and erosion during heavy rains. Loss of businesses and temporary unemployment caused by the fire would have a significant effect on the local economy.

Impact on the Public Confidence in Government	The public's confidence is highly dependent on the public's perception on how well response and recovery are handled during and after an event. A response that either shows or gives the impression the County is prepared and responsive to the public's needs and that it manages a recovery to get its services back to full operational capabilities and damage repaired in a timely manner will maintain or enhance the County's reputation. Robust public communication about County response efforts will maintain trust in the government.

4.10.1.5 Secondary Hazards

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildfires cause the contamination of reservoirs, destroy transmission lines, and contribute to flooding. Wildfires strip slopes of vegetation, exposing them to greater amounts of runoff. This, in turn, can weaken soils and cause failures on slopes. Major landslides can occur several years after a wildfire. Most wildfires burn hot and for long durations that can bake soils, especially those high in clay content, thus increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding. Large amount of ash, topsoil, and debris can then wash into streams and rivers.

4.10.1.6 Future Condition Impacts

The County has experienced significant growth over the last decade and is expected to continue this trend, projecting 58% growth between 2010 and 2030. Exposure and risk to wildfire is expected to increase as development and population growth continue.

According to the El Paso County Wildfire Protection Plan, the El Paso County Land Development Code regulates new development in unincorporated areas that are forested or have been otherwise identified as being at risk of wildland fire, according to the Colorado Vegetation Classification Project. The County maintains a map to identify the forested areas where the wildland fire standards of the code apply. Before a permit is issued for building in these areas, a builder must commit to take actions to reduce the ignitability of new structures and to support wildfire suppression activities (El Paso County Emergency Services Division, 2011). Additionally, some fire protection districts in the County have adopted the International Fire Code with local amendments, which requires certain building features and vegetation mitigation for new construction in WUI areas defined by each local jurisdiction (El Paso County Emergency Services Division, 2011).

Colorado Springs requires new construction in its hillside neighborhoods to comply with its Hillside Development Manual. Along with best practices for safe and aesthetic development of steep terrain, the manual mandates three types of actions to reduce wildfire risk: management of fuels and defensible space, fire detection and protection systems, and Class A roofing materials (El Paso County Emergency Services Division, 2011).

There continues to be growth and development on private lands in the WUI and it is expected that development in high risk areas will continue. By identifying areas with significant potential for population

growth and/or future development in high-risk areas, communities can identify areas of mitigation interest and reduce hazard risks associated with increased exposure.

Fire in western ecosystems is affected by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods. Climate scenarios project summer temperature increases between 2°C and 5°C and precipitation decreases of up to 15 percent. Such conditions would exacerbate summer drought and further promote high-elevation wildfires.

4.10.1.7 Issues

The major issues for wildfire are the following:

- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.
- Wildfires could cause landslides and debris flows as a secondary natural hazard.
- Climate change could affect the wildfire hazard.
- Future growth into wildland-urban interface areas should continue to be managed.
- Area fire districts and local governments need to continue to exercise and train on WUI events and emergency evacuation.
- Vegetation management activities would include enhancement through expansion of the target areas as well as additional resources.
- Regional consistency of higher building code standards such as residential sprinkler requirements and prohibitive combustible roof standards.
- Fire department water supply in high risk wildfire areas.
- Expand certifications and qualifications for fire department personnel. Ensure that all firefighters are trained in basic wildfire behavior, basic fire weather, and that all company officers and chief level officers are trained in the wildland command and strike team leader level.
- Evaluate and designate emergency ingress / egress routes in WUI areas and in new land development.
- Tools such as land use planning, zoning ordinances, building code, and subdivision regulations should be considered to mitigate risk.

4.11 HUMAN-CAUSED HAZARDS

Human-caused hazards refer to threats to life safety and property originating from and caused by people, either inadvertently (from ignorance, accident, or negligence) or intentionally. Human-caused hazards are not generally caused by natural phenomena, but infectious disease can absolutely be influenced by it. However, due to the fact that infectious disease is greatly influenced by human activity, it is included here. Human-caused hazards for the Pikes Peak Region include:

- Hazardous Material Incidents
- Extreme Acts of Violence
- Cyber-attack
- Epidemic/Pandemic
- Major Aircraft Incident

4.11.1 HAZARDOUS MATERIALS

4.11.1.1 Definition and Extent

Incidents involving hazardous materials (HAZMAT) have the potential to be one of El Paso County's most catastrophic risks. There are currently over 380 chemicals that are listed on the Environmental Protection Agency's (EPA) Extremely Hazardous Substance List. Federal Law (42 USC, Title III) places several requirements on local governments and businesses that apply to HAZMAT reporting and response. Title III has four primary requirements that: 1) establishes mandatory training requirements for first responders (29 CFR 1910.120) and the requirement to establish a Local (Chemical) Emergency Planning Committee (LEPC). These chemicals are used in industry, agriculture, medicine, research and consumer goods and come in the form of explosives, flammable and combustible substances, poisons and radioactive materials; 2) requires that any facility that maintains Extremely Hazardous Material at certain quantities must report them to the local LEPC . The reporting method is via the Tier II report established by EPA; 3) makes the Tier II reports available to the public upon request; and 4) the local government LEPC must establish a method of emergency notification should a life-threatening HAZMAT spill occur. This emergency notification is outlined in PPROEM's HAZMAT plan which also explains the regional response capability, a DERA requirement.

DEFINITIONS

Hazardous Materials: FEMA defines Hazardous Materials as chemical substances that, if released or misused, can pose a threat to the environment or health.

Tier II Report: Known officially as Emergency and Hazardous Chemical Inventory Forms, forms that organizations and businesses in the United States with hazardous chemicals above certain quantities, are required to fill out by the EPA.

Local Emergency Planning Committee: Committee that meets quarterly and consists of government, first responders, and local businesses that respond to or maintain Hazardous Materials.

Designated Emergency Response Authority: responsible for planning and coordinating emergency response to HAZMAT spills within the County and maintain a HAZMAT response plan that is in accordance with 42 USC.

In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous substances that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days and some chemicals can be damaging for years. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, weather, and possibly wildlife.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

There are three recognized sources for HAZMAT incidents within the jurisdiction, including: delivery lines, fixed facilities storage and use locations, and identified transportation routes.

Delivery Lines

Natural gas and petroleum-based products are transported through the jurisdiction using transmission pipelines which are typically composed of high-strength steel or poly-vinyl chloride (PVC) of various sizes and pressures. These lines move large quantities of natural gas and petroleum-based products from the producing regions to local distribution companies, as well as to customers. The pressure in each section of line typically ranges from 200 pounds to 1,500 pounds per square inch depending on the type of area in which the pipeline is operating. As a safety measure, pipelines are designed to handle greater pressures than are actually delivered in a system. For example, pipelines in more populated areas operate at less than half of their design pressure level. Additionally, many major pipelines are "looped" allowing for two or more lines running parallel to each other in the same right of way. This provides maximum capacity during peak demand periods.

Fixed Facilities

El Paso County has numerous facilities and occupancies that contain hazardous materials for various industrial or commercial uses. For example, water and gas utilities are the largest users of common hazardous materials. Food processing, storage, and distribution companies use high quantities of refrigerants containing hazardous agents. Several industrial mining laboratories contain chemical inventories for testing and processing samples. Vehicle repair shops keep chemicals for welding and other shop repair services. These facilities are required to report to their respective county or City of Colorado Springs - Local Emergency Planning Committee and maintain detection and suppression systems to mitigate the increased risks. County HAZMAT personnel and/or City HAZMAT inspectors also inspect facilities containing hazardous materials and review emergency procedures to verify reporting compliance and preplan for emergencies.

Transportation Routes

Transportation of hazardous materials through the jurisdiction occurs by way of aircraft, freight train, and over-the-road commercial carriers. Over-the-road carriers account for the largest number of hazardous materials movements through the county; however, rail movements consist of larger quantities in a given movement. Data as to the number of vehicles as well as types and quantities of materials transiting the planning area is limited and it is impossible to know exactly what is on a section of a transportation route at any given time. Most over-the-road HAZMAT incidents involve passenger vehicles that leak 25 gallons or less of gasoline, which first arriving units mitigate without additional resources. Larger spills, however, typically require additional resources, which includes the El Paso County and Colorado Springs Fire Department HAZMAT Team and/or other regional resources.

4.11.1.2 Previous Occurrences

The Pipeline and Hazardous Materials Safety Administration has recorded over 370 spills of hazardous materials on transportation routes in El Paso County since 1972. The majority of those, about 95 percent, occurred on highways and involved small spills that happened when materials leaked. According to an

article published in *The Gazette*, some of those spills caused hundreds of thousands of dollars worth of damage and prompted evacuations, but those cases are infrequent, the data show. The article goes on to state, "large accidents by rail are rare in the region, but when they do happen, they can be costly (Hobbs, Louis-Sanchez, 2015)."

Provided below are details from some of the more significant hazardous material incidents.

August 26, 2016 - Spill of 8,000 gallons of diesel and unleaded fuel resulted in contamination of Fountain Creek from Motor City to Pueblo. Colorado Springs Fire Department, Colorado Springs Utilities, and Environmental Protection Agency responded.

April 19, 2015 - On the night of April 19, 2015, a train derailment near Colorado Springs left seven cars on their side and dry ammonia leaking from a couple of the cars. There were 13 cars on the BNSF train. The incident occurred just south of Sierra Madre Street and Fountain Avenue and it appeared that the train may have been travelling too fast to take the curve. The contents of the spill were ammonium sulfate, an ingredient in fertilizer which is much less hazardous than other dry ammonia types. No evacuations were ordered, and cleanup was completed in a few days.

April 20, 2011 - A freight train traveling north near the Monument area was notified by a south bound train that one of its cars was possibly leaking. The north bound train stopped to investigate and confirmed a small leak from a hydrochloric acid car. Responders were notified by the train company. Responders from BNSF, Tri Lakes Monument and El Paso County Hazmat responded to the scene. The leaking car was located on the main line adjacent to a subdivision. Due to concerns over a product release as the result of a catastrophic failure of the tank car and predicted weather, the decision was made to order an evacuation of the subdivision adjacent to the rail line and all rail traffic was stopped on that segment of the rail line. The rail company acquired a replacement tank car and flew in a team of specialists and equipment to offload the contents of the damaged car into an empty car. The evacuation was lifted and rail traffic resumed after a majority of the product was off loaded. El Paso County HAZMAT personnel and Fort Carson HAZMAT personnel remained on scene to support the team off loading the contents of the car. The contamination was confined to the railroad right of way and the rail car was removed by BNSF. "The leak prompted the evacuation of 250 nearby homes. No one was reported injured, but the damages for the incident cost an estimated $137,000 (Hobbs, Louis-Sanchez, 2015)."

April 6, 2010 - The driver stated he swerved to avoid another vehicle on the roadway and lost control. The truck went off the west side of the roadway and rolled coming to rest in the ditch on the west side of the southbound lanes. The trailer of the vehicle was a multi compartmented MC406/DOT306 tanker hauling gasoline. During the rollover the front compartment of the trailer was compromised spilling a portion of the gasoline in that compartment. The remaining fuel was removed from the trailer and the vehicle was up righted and removed. HAZMAT teams from El Paso County and Colorado State Patrol performed the fuel transfer with support from Tri-Lakes Monument Fire Protection District. The interstate was closed for several hours due to safety concerns and to accommodate incident operations.

There are numerous incidents each year of smaller scale Hazardous materials cleanup operations. These range from vehicle fuel spills, to leaking containers, to support of law enforcement agencies. Although

small in scale, the complexity of crime scene preservation or location of incidents can make these responses just as challenging.

Figure 4-60. Past Hazardous Material Incidents

Tanker overturn on I25 (2010)

Law enforcement support (2012)

Helicopter on Pikes Peak (2010)

4.11.1.3 Vulnerability

Table 4-70: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Occasional	Limited	Limited	Minimal	Minor	Low
Colorado Springs	Likely	Critical	Moderate	Minimal	Moderate	High
El Paso County	Likely	Limited	Limited	Minimal	Moderate	Moderate
Fountain	Likely	Critical	Significant	Minimal	Moderate	High
Green Mtn Falls	Occasional	Limited	Limited	Minimal	Minor	Low
Manitou Springs	Occasional	Limited	Limited	Minimal	Moderate	Moderate
Monument	Likely	Critical	Significant	Minimal	Moderate	High
Palmer Lake	Occasional	Limited	Significant	Minimal	Moderate	Moderate
Ramah	Occasional	Limited	Limited	Minimal	Minor	Low
Regionwide	Occasional	Limited	Limited	Minimal	Moderate	Moderate

Spatial Extent and Geographic Location

There are many sources of hazardous materials in the Pikes Peak Region. These sources include chemical manufacturers, service stations, healthcare facilities and hazardous materials disposal sites. Hazardous materials are also shipped daily on area highways and railroads, to include a major railroad that runs through the center of Colorado Springs.

A hazardous material incident can occur in a variety of locations and spatial extents. Some incidents (such as a fuel spill) can occur in a small location and impact a small spatial extent. Others, such as the release of toxic chemicals, may occur from a small location or source but can spread over large areas.

Figure 4-61 and

Figure 4-62 depicts the potential exposure based on a half mile buffer from delivery lines, fixed facilities storage and use locations, and identified hazmat transportation routes.

The risk for Calhan and Ramah is low. The areas do not have exposure from large industry. The largest potential exposure arises from hazardous materials, such as gas, alcohol and diesel, in transit on Highway 24. Palmer Lake, Green Mountain Falls, Fountain, Manitou Springs, and Monument has low or no industrial activity that would pose a risk. They do have potential exposure from vehicles in transit on highways. Palmer Lake, Fountain, and Monument also have potential exposure from rail lines. Rail lines may carry more hazardous materials through, including loads of coal.

The City of Colorado Springs has the largest exposure to industrial activity and materials in transit on highway and rail lines. The City also has the largest population density within hazardous materials impact locations.

Figure 4-61. Primary Hazardous Materials Impact Locations, El Paso County

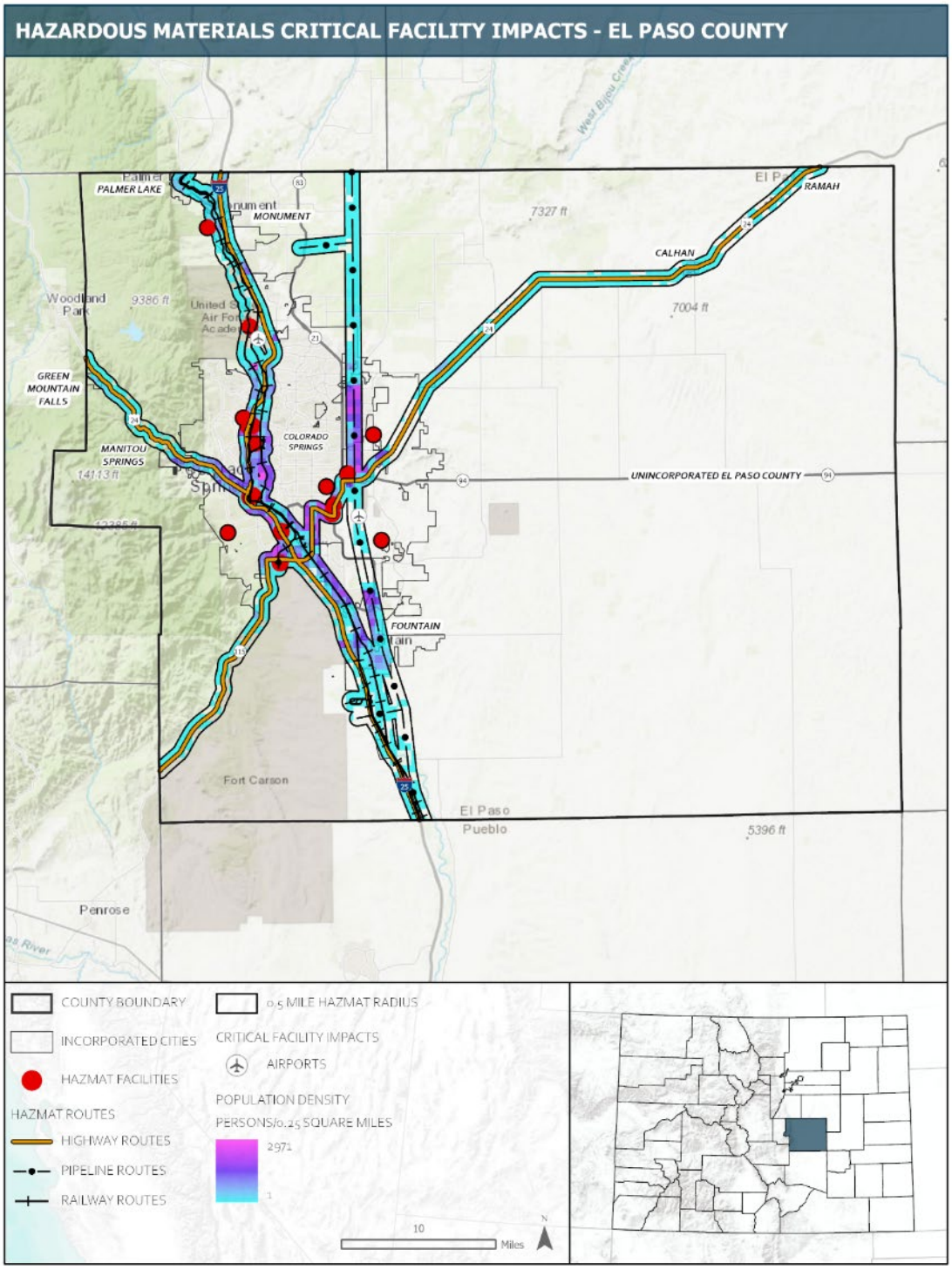
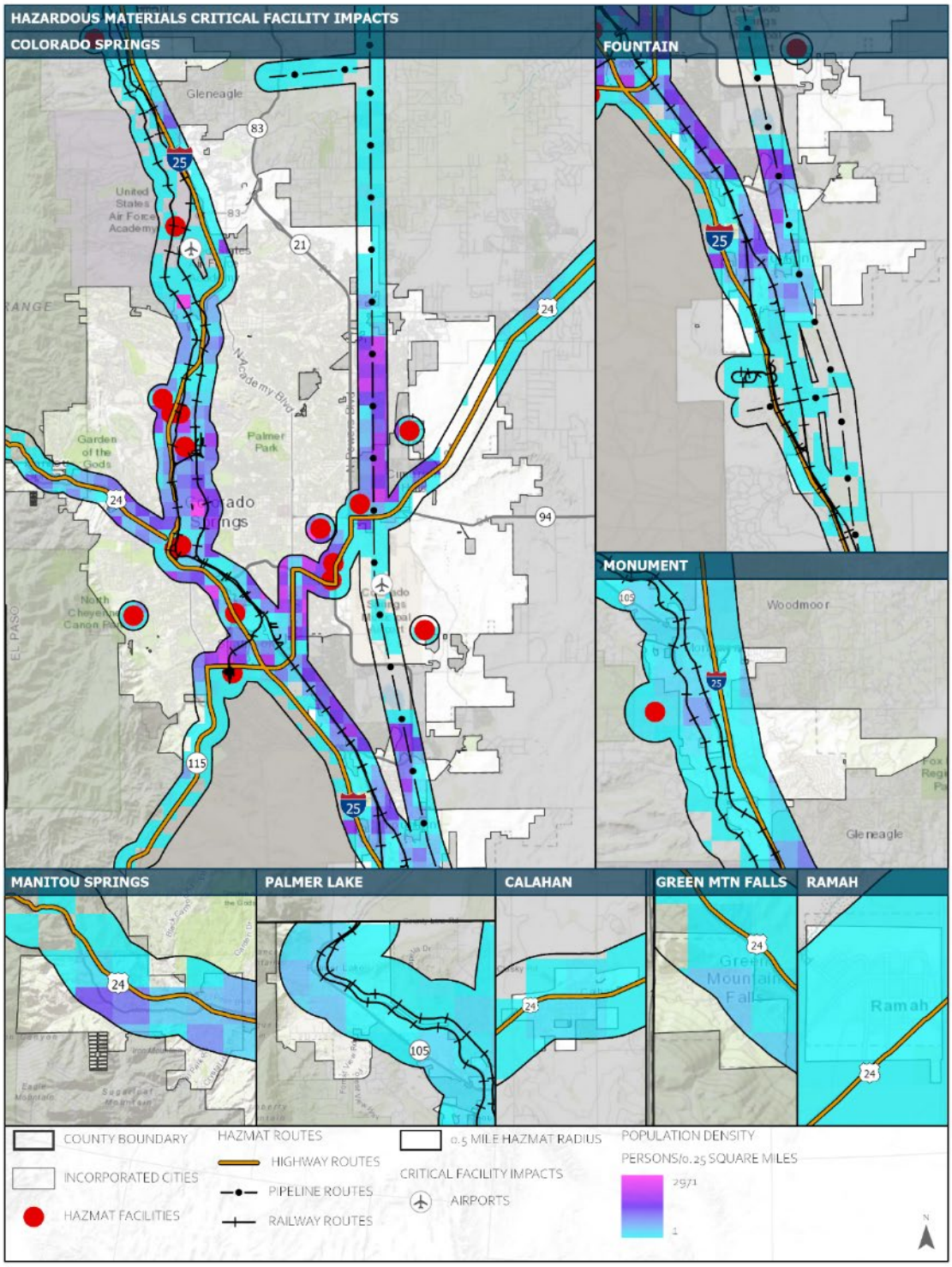


Figure 4-62. Primary Hazardous Materials Impact Locations, Participating Jurisdictions



Delivery Lines

Numerous gas and petroleum-based pipelines traverse the jurisdiction and a full accounting of their locations and size of lines is not practical for display in this document. Most ruptures or delivery system malfunctions are isolated events with limited potential to become large-scale incidents. For most of these events, the primary hazard is the flammable/combustible nature of the gas compounds. Since a majority of these incidents occur outside of structures, the risk to the loss of life is isolated to the immediate area of origin or nearby structures where gases can accumulate. Utility providers can provide more detailed information of their infrastructure including location, pressure, line diameter, as well as the types of commodities and quantities that flow through specific lines.

Fixed Facility

The Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires facilities storing hazardous materials to report those substances annually to the State Emergency Response Commission, the Local Emergency Planning Committee (LEPC), and local fire departments. There are many such facilities located throughout the Pikes Peak Region, though many do not store substances or quantities of such that are considered extremely hazardous. Of greater concern to the emergency management community are those facilities that use or produce toxic chemicals above specific thresholds that pose major threats to human life and safety. These include the 20 Toxic Release Inventory (TRI) facilities in El Paso County listed on the U.S. Environmental Protection Agency's (EPA) website, as noted in Table 4-71.

Table 4-71: EPA's Toxic Release Inventory Quick Facts for 2018

Quick Facts for 2018	
Number of TRI Facilities	***20***
Total Production-Related Waste Managed	***1.8 billion lbs***
Total On-site and Off-site Disposal or Other Releases	***841.7 thousand lbs***
Total On-site:	***803.9 thousand lbs***
Air	***50.2 thousand lbs***
Water	***155.2 thousand lbs***
Land	***598.4 thousand lbs***
Total Off-site	***37.8 thousand lbs***

Source: EPA Quick Facts website
https://enviro.epa.gov/triexplorer/tri_factsheet.factsheet?pParent=TRIQ1&pDataset=TRIQ1&pstate=CO&pcounty=El%20Paso&pFips=08041&pyear=2018

Of the releases to air (50.2 thousand pounds), Ammonia is 34%; Hydrogen Fluoride is 24%; Hydrochloric Acid is 10%; Hydrogen Sulfide is 9%; N-Methyl-2-Pyrrolidone is 8%; and Other is 15%. Of the releases to water (155.2 thousand pounds), 100% is Nitrate Compounds. No detailed information is provided on EPA's website for off-site releases.

Transportation Routes

Aircraft:

Aircraft transit the jurisdiction frequently with the majority of commercial traffic existing within Colorado Springs Municipal Airport's airspace and fixed facilities. There is also significant military air traffic. Although aircraft incidents/accidents occur throughout the jurisdiction, most HAZMAT related incidents occur within the airport grounds and are generally focused on fuel spills. Peterson Air Force Base responds to most incidents within airport secured areas.

Rail:

Quantities of hazardous and nonhazardous materials are routinely transported by rail through El Paso County by Union Pacific (UP) and Burlington Northern & Santa Fe (BNSF) railroads. The railroad right of way runs through several jurisdictions from the northern county line to the southern county line, and generally parallels Interstate 25. Commodity flow studies based on 2018 data indicate that crude oil shipments through El Paso County have decreased in frequency over the last two years. According to the data, BNSF ships a majority of the hazardous loads passing through El Paso County. For BNSF, the three hazardous commodities with the highest number of loaded cars included: Class 2 (Petroleum gases, Liquefied), Class 9 (Elevated Temperature Materials), and Class 3 (Alcohols, NOS).

There is a heightened sense of vulnerability to rail traffic due to the shipping of crude petroleum that has resulted in several catastrophic events when derailments have occurred within other jurisdictions.

Over-the-Road:

Hazardous materials are routinely transported by carriers to destinations within El Paso County including federal, state, and county roads. Interstate 25, East and West Highway 24, and Highway 115 are designated by the State of Colorado as hazardous materials transportation routes. Although no other roadways are specifically designated for shipment of hazardous materials, local delivery of hazardous commodities is allowed on all roadways.

Traffic Flow studies conducted by EPC OEM along hazmat routes within El Paso County were completed to obtain a snapshot of the type and frequency of commodities transported along the routes described above. The flow study found Interstate 25 to be by far the busiest hazardous materials route passing through El Paso County, with multiple loads of all hazard classes passing through this area on a regular basis.

Probability of Future Occurrence

Due to the continuous presence of hazardous materials being transported or stored in and around the Pikes Peak region, small HAZMAT incidents are considered **"highly likely"** future events. However, based on historic events, the overall probability of a critical or catastrophic incident occurring is considered **low**, occurring on an occasional basis. There have been no reported incidents at fixed facilities or high-pressure gas lines that have required hazmat intervention in the planning area within the last 10 years. Further, El Paso County has very little heavy industrial, the majority of facilities are light industrial.

Delivery Lines

Highly Likely: near 100 percent annual probability of occurrence. El Paso County experiences a delivery line rupture or cut several times a week on average. The overwhelming majority of the leaks involve

residential delivery systems and do not involve DOT regulated transmission pipelines. The majority of leaks are contained quickly without any major service disruption. It is not likely that a major transmission line will rupture; however, as the area continues to grow, additional demand will continue to stress aging infrastructure.

Fixed Facility

Highly Likely: near 100 percent annual probability of occurrence. El Paso County experiences a HAZMAT release within or on a fixed facility site every year. These incidents are typically small in nature and require limited response that is focused on cleanup. With the increase in number of Tier II reporting facilities, the probability that additional incidents will occur also rises. It is also reasonable to assume that with population growth and facility incursion, the typical response may also become more complex in nature requiring additional evacuations.

Transportation

Aircraft:

Unlikely: less than 1 percent probability of annual occurrence. El Paso County has not experienced a major HAZMAT release related to an aircraft accident. Much of the HAZMAT related to this type of incident is a result of a limited quantity of aviation fuel spilled and not related to the transportation of cargo.

Sixteen aircraft related incidents have been reported in the last 43 years; however, as stated above, the reports were not related to hazmat release, rather, all were minor leaks and spills primarily related to other sources.

Rail:

Occasional: between 1 and 25 percent probability of annual occurrence. Within the Region, there have been a couple HAZMAT releases due to freight train incidents. One incident of a rail car leaking hazardous materials caused an evacuation of nearby residents while the leak could be contained but was not due to an accident, but rather equipment failure during commodity transport. The probability of a release within the planning area is determined to be less probable due to a limited number of vehicle crossing points, and the restricted number of freight yards where hazardous materials are loaded or off loaded.

Over-the-Road:

Highly Likely: near 100 percent annual probability of occurrence. El Paso County experiences an annual HAZMAT release due to an over-the-road transport accident every year. Given that the majority of hazardous materials transported through the jurisdiction occurs using over-the-road commercial carriers, and that motor vehicles accidents account for the highest percentage of incidents, this will continue to be the biggest threat for HAZMAT-related incidents to occur. Due to the volume of over-the-road traffic and the unpredictability of when or where an incident may transpire, it is difficult to predict higher risk areas outside of higher trafficked locations.

Magnitude / Severity

The severity of a HAZMAT-related incident ranges from extremely limited and contained within a localized area, to catastrophic incidents effecting large areas and/or populations. Large releases are capable of harming individuals, the environment, and animals; as well as causing severe economic disruption. The severity of each source of potential HAZMAT release is dependent upon several variables: material involved, quantities released, location of the incident (e.g., proximity to densely populated areas, access to waterways, etc.), and weather conditions.

While HAZMAT-related incidents have the potential to be **critical** with isolated deaths and/or multiple injuries; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours, within El Paso County the historic occurrence of critical hazmat incidents is extremely infrequent. Therefore, for this profile, the magnitude/severity is considered to be overall **limited** for all jurisdictions except for Colorado Springs, Monument, and Fountain, which are considered critical due their high population density and location near major over-the-road and rail transportation routes.

Delivery Lines

Limited - The rupture or cutting of delivery lines typically occurs in El Paso County's more urban and suburban areas. This exposes more people to the risk of potential life loss, injuries, and loss of property; however, these incidents are normally localized and do not affect large areas. The potential for a major delivery line rupture is significantly less, but could require large scale sheltering or evacuation efforts.

Fixed Facility

Limited - The release of fixed facility HAZMAT is typically confined to a limited and enclosed area. Additionally, these facilities are required to regularly report their onsite quantities under SARA Title III, subject to regular inspections.

Transportation

Aircraft:

Limited - The data is not available to indicate the amount of hazardous materials transported via this mode of transportation. Given the lack of historical data, there is limited exposure of life loss, injuries, economic loss, or environmental damage resulting from a HAZMAT release due to an aircraft accident.

Rail:

Critical - The impact of a freight rail accident is most associated with the potential release of hazardous materials contained in the cars. As urban density increases, the population living or working within one mile of the rail lines will grow, increasing the potential for exposure. The quantity of HAZMAT being transported, as well as the nature and complexity of rail accidents, make the potential for higher impact and long-term disruption greater.

Over-the-Road:

Limited - At any given time, HAZMAT may be transported off of the major designated roadways within the county for local delivery. This brings HAZMAT in close proximity to more of the population and

increases the risk of exposure. Although this mode of transportation is the highest frequency, the limited quantities of hazardous materials will greatly reduce the affected area.

Warning Time

The nature of hazardous materials accidents is often dynamic with little to no warning time. This makes understanding the most likely potential threat locations critical for a rapid initiation of protective measures for local populations and response actions.

Exposure and Losses

Estimated potential losses are difficult to calculate because different hazardous materials have different impacts and other factors such as quantity or surrounding areas that may greatly influence the volatility of the released materials. While explosions involving hazardous materials are possible and would impact any nearby buildings and facilities, it is generally assumed that the greatest risk would be to human health and safety. The populations at greatest risk are those living and working within one mile of Interstate 25 and the railway or the population within a mile of a fixed facility.

➢ Property

The potential for property loss is widespread, though with a low probability. Table 4-72 shows the potential losses to structures within the planning area. Hazardous materials are prolific throughout the area, creating a large geography for impact. However, the likelihood of impact on a large scale is low.

Table 4-72: Loss Estimates for Property Exposed to Potential Hazardous Materials Incidents

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Estimated Loss Potential			
			10% Damage	30% Damage	50% Damage	100% Damage
Calhan	511	100%	$5,845,421	$17,536,263	$29,227,106	$58,454,211
Colorado Springs	42,236	30%	$2,440,398,795	$7,321,196,384	$12,201,993,974	$13,669,715,773
El Paso County	23,302	31%	$869,375,668	$2,608,127,004	$4,346,878,341	$5,253,381,481
Fountain	6,605	76%	$201,804,436	$605,413,307	$1,009,022,178	$1,481,209,357
Green Mtn Falls	279	74%	$8,072,542	$24,217,626	$40,362,711	$59,365,024
Manitou Springs	1,702	79%	$65,004,119	$195,012,356	$325,020,594	$498,418,694
Monument	1,169	49%	$69,835,694	$209,507,081	$349,178,469	$425,629,143
Palmer Lake	1,013	80%	$31,650,052	$94,950,156	$158,250,260	$231,930,181
Ramah	91	100%	$525,105	$1,575,314	$2,625,524	$5,251,048
Regionwide	**76,908**	**33%**	**$3,692,511,831**	**$11,077,535,492**	**$18,462,559,154**	**$21,683,354,913**

➢ Population

Table 4-73 identifies the potential exposure to population based on a half-mile buffer from delivery lines, fixed facilities storage and use locations, and identified transportation routes. Although jurisdictions such

as Calhan, Green Mountain Falls, Manitou Springs, and Ramah have widespread exposure, the risk is low and primarily arises from hazardous materials, such as gas, alcohol and diesel, in transit on Highway 24.

Table 4-73: Population Exposed to Potential Hazardous Material Incidents

	Exposed Population Count	Exposed Population (%)
Calhan	502	100%
Colorado Springs	114,541	28%
El Paso County	62,436	39%
Fountain	19,757	76%
Green Mtn Falls	489	73%
Manitou Springs	3,961	80%
Monument	2,170	40%
Palmer Lake	1,967	80%
Ramah	99	100%
Regionwide	**205,923**	**34%**

➢ Environment

Accidents involving chemicals or radioactive materials represent a significant threat to the environment, public health and safety, and community well-being. In an increasingly complex and interconnected world, no community is immune from the threat posed by environmental accidents and contamination. Even communities far removed from industrial production or storage facilities can still be at risk from accidents associated with the transport of hazardous materials. Major transportation accidents involving hazardous materials have been shown to produce profound economic, social, and psychological impacts in affected communities. These impacts can be both widespread and long lasting.

➢ Critical Facilities and Infrastructure

Many of the major delivery systems and the infrastructure surrounding them are considered critical infrastructure. An incident occurring on a transportation route, whether rail or ground, would potentially close traffic, creating cascading effects. There are several fixed sites, such as water treatment facilities, that may reduce service if an incident were to occur on premises, or when effected by a nearby facility or transportation incident requiring evacuations. Discussion on specific facilities will be withheld due to security concerns, but information for planners may be obtained through specific agencies.

Critical facilities within a half-mile buffer from delivery lines, fixed facilities storage and use locations, and identified transportation routes include 2 airports, 2 emergency centers, and several healthcare facilities. Additionally, over 100 schools are in potential exposure areas, as are several hazardous material storage facilities. Infrastructure facilities exposed to potential hazmat incidents include a handful of communication, water, wastewater, and power facilities, as well as many miles of highway and rail infrastructure.

4.11.1.4 Consequence Analysis

Hazardous Materials Consequence Analysis	
Category	**Narrative**
Hazard Description	Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.
Impact to Property, Facilities, and Infrastructure	Real property may become generally unusable due to contamination depending on the nature of the hazardous materials event. Also, it may be impossible to occupy industrial or business sites due to contamination. Facilities in the immediate vicinity of a hazardous materials event could become temporarily or permanently uninhabitable due to contamination. Public and private infrastructure could be shut down or destroyed by a hazardous materials event. The type of infrastructure destroyed would depend on the nature of the event and the extent of its effects. Method of transportation (trucks, airplane, rail, etc.) may be severely impacted during a transportation incident and may become unusable. Damage to facilities and infrastructure could be severe depending on the type of hazardous material. An explosion or fire could cause severe damage. Any hazardous material event could cause facilities and infrastructure to become unusable until the contamination is cleaned up.
Impact on the Environment	The impact on the environment will depend on where the event is located and the extent of the contamination. The animals and plants in or near the hazardous materials event will be impacted. Groundwater and soil can become contaminated when exposed to hazardous material which makes cleanups very costly. Damage may require costly remediation.
Impact on Responders	The immediate first responders on scene may be unable to perform their duties due to the nature of a hazardous materials event. If the proper precautions, training and personal protective equipment (PPE) is not used, responders can put their health and lives in danger during a hazardous materials event. Any type of long- or short-term contact with a particular chemical can be hazardous to a responder. Overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services would also be impacted by blocked roadways caused by the hazardous materials. The time impact could be significant if the hazardous materials is in a critical transportation juncture or cover a large area to be cleaned up.
Impact on Continuity of	Loss of facilities or transportation infrastructure can impact the ability to deliver goods and services efficiently. The El Paso County Hazardous Materials Plan defines

Operations, Continuity of Government, and Delivery of Services	the roles and responsibilities of EPC Hazmat and supporting agencies for a coordinated response to, as well as support and management, of resources throughout a hazardous materials condition or incident within unincorporated EPC and smaller municipalities therein.
Impact on the Public	A serious hazardous materials event can have a great impact on the public surrounding the site. The impact will depend upon the nature of the hazardous materials, the amount of contact an individual has with the chemical, and any explosion or fire associated with the event. Immediate notification to the public regarding the hazardous materials event is vital in maintaining public safety. Areas with high population are more at risk.
Impact on the Economic Condition of the County	Hazardous materials can be particularly destructive to an economy. A hazardous materials event can leave localities or entire regions uninhabitable. Can cause deaths and injuries. They can destroy facilities and contaminate water and food stocks. Areas that have been affected by an event are also not attractive to tourists.
Impact on the Public Confidence in Government	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective. During a hazardous materials incident or other significant event, appropriate information flow to the public, other agencies and partners will help to facilitate public safety, combat rumors, misinformation and public panic.

4.11.1.5 Secondary Hazards

The most likely secondary hazards associated with a HAZMAT incident would be secondary or expanding fires associated with the initial incident and environmental damage created through exposure to toxins. It is much more likely, however, that a hazardous materials incident will be secondary to another hazard such as a flood, wildland fire, and tornado among others.

4.11.1.6 Future Condition Impacts

It is anticipated that this region will continue to experience significant population growth and development, which will increase this population exposure to potential life loss, injuries, and environmental damage resulting from a hazardous materials release.

The Colorado Department of Transportation 2019 Colorado Freight Plan describes the impact of incompatible land uses developing in proximity to rail lines, stating “as areas surrounding current rail infrastructure are developed for residential, commercial, or other incompatible land uses, the ability of railroads to fully use or expand existing infrastructure and assets may be limited. Mixed-use development near existing rail assets may impose constraints on rail operations related to noise, safety, and hazardous materials. Improved zoning, regional freight land use planning, and continued coordination between local agencies and private railroads can mitigate incompatible development (such as schools, hospitals, dense residential developments, etc.) from occurring along or near rail lines (CDOT, 2019).”

Local planning and building departments and other agencies are taking steps to ensure proper storage, handling and maintenance of hazardous materials. For instance, the Colorado Springs Fire Department requires Hazardous Materials Permitting and Plan Review. CSP is the primary DERA for state roads and

EPC Hazmat responds as mutual aid to CSP and in the event CSP Hazmat is not available. Additionally, the State of Colorado Highway Patrol has a mutual aid agreement with the El Paso County and City of Colorado Springs HAZMAT Teams to respond to all spills on I-25.

4.11.1.7 Issues

Important issues associated with a hazardous materials release in the planning area include the following:

- It is extremely difficult to predict the next incident location.
- The self-reporting nature of Tier II facilities does not ensure all locations are identified.
- It is impossible to know where HAZMAT is being transported at any given time.
- Population density is increasing around potential hazardous material incident areas.
- Incompatible land uses developing in proximity to potential incident locations.

4.11.2 EXTREME ACTS OF VIOLENCE

4.11.2.1 Definition and Extent

In September 2019, the Department of Homeland Security released its Strategic Framework for Countering Terrorism and Targeted Violence, which identifies three major threat actors, including Foreign Terrorist Organizations (FTOs), Domestic Terrorism, and Targeted Violence.

Foreign Terrorist Organizations (FTOs)

FTOs are foreign organizations that are designated by the Secretary of State in accordance with section 219 of the Immigration and Nationality Act as amended. The suspected terrorist group must meet three criteria to be designated a FTO, including: be a foreign organization, engage in or retain the capability and intent to engage in terrorism, and threaten the security of U.S. nationals or the national security (national defense, foreign relations, or the economic interest) of the United States. The Radical Islamist Terrorist Threat, including but not limited to ISIS, al-Qa'ida, and Hizballah are examples of Designated FTOs.

Domestic terrorism

Domestic terrorism, a phrase typically used to denote terrorists who are not directed or inspired by FTOs, have caused more deaths in the United States in recent years than have terrorists connected to FTOs. According to the U.S. Department of Justice, Federal Bureau of Investigation (FBI), Domestic terrorism is defined as "violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature." Domestic terrorist attacks and hate crimes sometimes overlap, as perpetrators of prominent domestic terrorist attacks have selected their targets based on factors such as race, ethnicity, national origin, religion, sexual orientation, gender, and gender identity.

DEFINITIONS

Extreme Acts of Violence: Terrorism and targeted violence intended to inflict mass injury, destruction, or death and/or is potentially destructive of critical infrastructure or key resources.

Foreign Terrorist Organization: Foreign organizations that are designated by the Secretary of State in accordance with section 219 of the Immigration and Nationality Act as amended.

Domestic Terrorism: Violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature.

Targeted Violence: attacks otherwise lacking a clearly discernible political, ideological, or religious motivation, but that are of such severity and magnitude as to suggest a clear intent to inflict a degree of mass injury, destruction, or death commensurate with known terrorist tactics.

Soft targets: Locations that are easily accessible to large numbers of people and that have limited security or protective measures in place.

According to the Department of Homeland Security "there is a growing threat from domestic actors, such as racially- and ethnically-motivated violent extremists, including white supremacist violent extremists, anti-government and anti-authority violent extremists, and other ideological strains that drive terrorist

violence. Lone attackers, as opposed to cells or organizations, generally perpetrate these kinds of attacks. But they are also part of a broader movement."

Examples of recent notable domestic terrorist attacks in the United states include: El Paso Walmart shooting (2019), Pittsburg synagogue shooting (2018), Orlando nightclub shooting (2016), Charleston church shooting (2015), and the Boston Marathon bombing (2013).

Targeted Violence

Unlike terrorism, targeted violence includes attacks otherwise lacking a clearly discernible political, ideological, or religious motivation, but that are of such severity and magnitude as to suggest a clear intent to inflict a degree of mass injury, destruction, or death commensurate with known terrorist tactics. Targeted violence may be a result of a perceived grievance, whether domestic, workplace, or of some other nature, and includes attacks within schools, places of worship, workplaces, large public gatherings, and other settings.

Evidence-based research on individuals who carry out acts of targeted violence demonstrates that regardless of whether the attacks were acts of workplace violence, domestic violence, school-based violence, or terrorism, similar themes are evident among the perpetrators. A 2018 U.S. Secret Service National Threat Assessment Center (NTAC) review of mass attacks in public spaces found:

- Most of the attackers utilized firearms, and half departed the site on their own or committed suicide.
- Half were motivated by a grievance related to a domestic situation, workplace, or other personal issue.
- Two-thirds had histories of mental health symptoms, including depressive, suicidal, and psychotic symptoms.
- Nearly all had at least one significant stressor within the last five years, and over half had indications of financial instability in that timeframe.
- Nearly all made threatening or concerning communications and more than three-quarters elicited concern from others prior to carrying out their attacks.

Mass attacks are a persistent problem and a grave concern. According to the U.S. Secret Service, 27 mass attacks were carried out in public spaces in the United States in 2018, killing 91 people. In 2017, 28 mass attacks claimed 147 lives. In the past three years, the Nation witnessed the two deadliest mass attacks in its modern history, including a 2017 shooting at an outdoor concert in Las Vegas that killed 58 and injured 869. The impact of such attacks on the victims, their families, friends, local communities, and the Nation is immense.

Examples of recent notable targeted violence attacks in the United states include: Virginia Beach City Building (2019), Stoneman Douglas High School, Parkland, Florida (2018), Borderline Bar & Grill, Thousand Oaks (2018), Las Vegas Concert (2017), San Bernardino (2015), Sandy Hook Elementary School (2012), Aurora Movie Theater (2012), and Virginia Tech (2007).

Soft targets and crowded places, such as shopping malls, schools, transportation systems, and sports venues, are particularly vulnerable to a terrorist or targeted violence attack. These locations are easily accessible to large numbers of people and have limited security or protective measures in place. Terrorists and other violent actors have plotted against or attacked such places using simple, low-cost methods with minimal identifiable indicators. As such, security awareness for soft targets and crowded places is an urgent focus area. Also, of concern, violent extremist groups have often proven adept at exploiting the Internet's potential. Advances in technology have played a critical role in facilitating the spread, evolution, and interaction of violent ideologies and narratives of personal grievance and have resulted in subsequent security implications.

The 2019 Colorado State Emergency Operations Plan (SEOP) lists specific terrorist acts / operations; including, but not limited to, the following general categories:

a) Chemical events, to include weapons of mass destruction

b) Biological events, including agri-terrorism (the direct, typically covert contamination of food supplies or the introduction of pests and/or disease agents to crops and livestock) and spread of disease

c) Nuclear / radiological events

d) Conventional events, to include bombings, arson, and armed assaults.

e) Infrastructure - cyber events, to include actions involving, or affecting, Information Technology, data processing and storage or interference with critical infrastructure

f) Delivery and employment of these items may entail use of mails, aircraft, watercraft, motor vehicles, or hand delivery to an intended target.

g) Any combination of the above methods of attack.

4.11.2.2 Previous Occurrences

Incidences of extreme acts of violence have been infrequent in the Pikes Peak region. Documented events are described below.

November 27, 2015 - A gunman attacked a Planned Parenthood clinic in Colorado Springs resulting in a five-hour standoff and the deaths of a police officer and two civilians. Numerous emergency service agencies responded to the incident and provided aide. OEM opened the EOC and provided logistical support for the response and recovery operations.

Laying flowers Saturday, Nov. 28, 2015, in honor of the victims of the deadly shooting at a Planned Parenthood clinic in Colorado Springs. Source: CBC

December 9, 2007 - An active shooter situation at New Life Church resulted in three fatalities. The incident was linked to a shooting earlier in the day at a youth ministry complex in Aurora,

Colorado, which resulted in a multi-jurisdictional event that included two cities. Colorado State Patrol, FBI and ATF were involved.

April 26, 1994 – A mail bomb kills man and injures his wife in Colorado Springs.

4.11.2.3 Vulnerability

Aside from the immediate injuries and loss of lives, the community impact of extreme violence takes many forms.

- Drain on emergency response resources: law enforcement, emergency medical services
- Business interruption
- Increased security expenses
- Business reduction due to negative public perception
- Behavioral and emotional health impacts to residents

Table 4-74: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Unlikely	Limited	Minor	Minimal	Negligible	Low
Colorado Springs	Occasional	Limited	Limited	Minimal	Negligible	Moderate
El Paso County	Occasional	Limited	Limited	Minimal	Negligible	Moderate
Fountain	Unlikely	Limited	Minor	Minimal	Negligible	Low
Green Mtn Falls	Unlikely	Limited	Minor	Minimal	Negligible	Low
Manitou Springs	Unlikely	Limited	Minor	Minimal	Negligible	Low
Monument	Unlikely	Limited	Minor	Minimal	Negligible	Low
Palmer Lake	Unlikely	Limited	Minor	Minimal	Negligible	Low
Ramah	Unlikely	Limited	Minor	Minimal	Negligible	Low
Regionwide	Unlikely	Limited	Minor	Minimal	Negligible	Low

Spatial Extent and Geographic Location

The location of terrorist attacks is unpredictable, although certain critical facilities and venues for large public gatherings are usually considered to have more inherent vulnerability. The City of Colorado Springs, like most metropolitan communities, has the potential to be a target of a terrorist attack. The City and El Paso County have a number of iconic sites in its military bases (Fort Carson, Cheyenne Mountain, the Air Force Academy, etc.) that could be targeted, as well as critical facilities, communication systems, water and utilities, monuments, and areas where large groups congregate (e.g., stadiums, conventions, worship areas).

Probability of Future Occurrence

Although all participating jurisdictions are potentially susceptible to extreme acts of violence, areas with greater numbers of soft targets, crowded spaces, critical facilities, and vulnerable populations targeted by hate groups are at higher risk.

***Foreign Terrorist Organization* - Unlikely:** Less than 1 percent chance of occurrence in the next year or a recurrence interval of greater than every 100 years.

Based on previous occurrences, it is unlikely that a foreign terrorist organization attack will occur in the Pikes Peak Region. However, given the presence of military bases in the region, the probability of occurrence increases slightly.

***Domestic Terrorism and Targeted Violence* - Occasional:** 1 to 25 percent chance of occurrence in the next year. Based on previous occurrences, three domestic and/or targeted violence attacks transpired in the region over a 25-year period, this equates to a recurrence interval of approximately 8 years.

The probability of future terrorist attacks is partially monitored by the U.S. Department of Homeland Security through the Homeland Security Advisory System. In Colorado, potential terrorist activities are monitored by the Colorado Springs Police Department (CSPD) with assistance from the FBI Joint Terrorism Task Force and the state fusion center called the Colorado Information Analysis Center (CIAC). Fusion centers are set up across the United States as focal points within the state and local environment for the receipt, analysis, gathering, and sharing of threat-related information and have additional responsibilities related to the coordination of critical operational capabilities. These centers are the priority for the allocation of available federal resources, including the deployment of personnel and connectivity with federal data systems.

Magnitude / Severity

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

***Domestic Terrorism and Targeted Violence* - Limited:** Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours to **Critical:** Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

The potential scenarios of a terrorist attack vary widely depending on the number of terrorists/attackers involved, the level of weaponry, the sophistication of the strategy, the choice of target, and the response time to the event. The severity of violent crime is most often measured in its effect on lives. Most incidents of mass violence injure or kill a fairly low number of people. On the other hand, as in the experience of the New Life Church shooting, an event with few casualties can still create a huge community impact. It is difficult to quantify the psychological impact of an incident on a population.

Warning Time

Minimal: less than 6 hours. It is rare that any actionable warning time is presented prior to the onset of an incident of this nature. On occasion there may be some time in a standoff or barricaded hostage situation in which mitigation actions can be executed.

Exposure and Losses

It is difficult to estimate potential losses from terrorism attacks because of the tremendous range of potential impact. Losses typically involve injury and fatalities in an armed attack but could also be massive property damage along with human injury if an explosive device is involved. While cyber-attacks may not physically harm a person or damage a building, the violation of secure information can result in massive financial losses or crippling of a system needed to operate an important facility. Future growth in the area could contribute to a slightly higher risk of terrorism as the population grows and is more diverse. Terrorism is highly subjective to events and reactions to events all over the world and is extremely difficult to predict.

➢ Property

Property damage can range from almost negligible to millions of dollars depending on the type of incident and the location it is carried out. Local iconic landmarks may be destroyed creating a psychological effect without significant injury or high dollar property loss. Property at risk is very difficult to determine due to the unpredictable nature of the threat and the wide variety of potential grievance targets. Incidents are typically localized in nature with limited property loss. The greatest impact may be economic due to loss of physical business assets, or loss of customer confidence.

➢ Population

It can be assumed that the entire population in the planning area is exposed to some level of risk at any given time. This risk is greater when located in high population density areas. Vulnerable populations are at greater risk in any situation in which safety depends on prompt action and rapid movement.

➢ Environment

Acts of extreme violence tend to have minimal impact on the environment with the exception of a potential hazardous materials release or an agri-terrorism attack.

➢ Critical Facilities and Infrastructure

Attacks directed at utility facilities and infrastructure may cause disruption in services or lead to potential cascading events that may proportionally impact local or regional populations more than physical damage.

The US Department of Homeland Security has identified sixteen Critical Infrastructure groups that may be potential targets for acts of terrorism at any level:

a) Agriculture and Food
b) Financial Services Sector
c) Chemical
d) Commercial Facilities
e) Communications
f) Critical Manufacturing
g) Dams
h) Defense Industrial Base
i) Emergency Services
j) Energy

k) Government Facilities
l) Healthcare and Public Health
m) Information Technology
n) Nuclear Reactors, Materials and Waste
o) Transportation Systems
p) Water

Most critical infrastructure has some form of active or passive measures in place to minimize exposure to, and mitigate effects of incidents of extreme violence. Systems are designed with redundancy to prevent long term loss of service, and facilities are "hardened" and/or access controlled. This limits the long-term exposure to incidents and allows for a rapid recovery.

4.11.2.4 Consequence Analysis

Acts of Extreme Violence Consequence Analysis	
Category	**Narrative**
Hazard Description	Violence intended to inflict mass injury, destruction, or death and/or is potentially destructive of critical infrastructure or key resources. Three major threat actors identified, including Foreign Terrorist Organizations (FTOs), Domestic Terrorism, and Targeted Violence. The City of Colorado Springs and El Paso County have a number of iconic sites in its military bases (Fort Carson, Cheyenne Mountain, the Air Force Academy, etc.) that could be targeted, as well as critical facilities, communication systems, water and utilities, monuments, and areas where large groups congregate (e.g., stadiums, conventions, worship areas).
Impact to Property, Facilities, and Infrastructure	Minimal property damage that does not threaten structural stability. Potential for long-term property damage that threatens structural stability. The type and magnitude of the terrorist attack will determine the damage or destruction of a jurisdiction's facilities. Buildings can be destroyed or rendered unsafe, equipment, electronic or mechanical, ruined or in some cases made inaccessible due to damage or contamination. Explosions and fire can render infrastructure such as roads, power lines, natural gas, fuel, water pipelines and sewage control facilities inoperable. Additionally, dams and other critical infrastructure could be significantly impacted depending on the type and magnitude of the terrorist attack.
Impact on the Environment	The impacts to the environment from a terrorist attack are often minimal, but can be significant in the case of a hazardous materials release or an agri-terrorism attack. The infrastructure of a large city, if destroyed, can cause lingering problems with contaminates, pollutants, hazardous debris, etc. The effects of attacks on water supplies and food crops can linger for long periods of time rendering the land or water unusable. Radiological damage can close entire geographical areas for years. Wildlife could also be impacted depending on the type and magnitude of the terrorist attack.

Impact on Responders	Impacts to responding personnel are similar to what can affect the citizens residing or working in the target area. They include medical problems and death from chemical agent exposure, explosion and fire trauma. Additionally, overtaxing of first responders physically and psychologically along with concern over the impact to responder families could cause additional risk to responders. Ambulance services could also be impacted depending on the type and magnitude of the terrorist attack. A danger of secondary attacks also exists.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Interruption of essential facilities and services for less than 24 hours. Potential for interruption of essential facilities and services for 24-72 hours. The City Colorado Springs Continuity of Operations (COOP) and Continuity of Government (COG) plans provide the framework to ensure that the City is able to perform essential functions under a broad range of circumstances, including damage to government facilities and infrastructure from terrorist acts. The El Paso County Emergency Operation Plan also provides the framework in preparation for, response to, and recovery from terrorist events.
Impact on the Public	Isolated deaths and/or multiple injuries and illnesses. Potential for multiple deaths. The effects of terrorism include, but are not limited to death, injury and a feeling of fear and helplessness in the general population. It can destroy property, lifelines and the basic social fabric. On a large scale, it destroys major portions of a large city's infrastructure creating physical and economic hardship for some time in addition to the initial death and destruction. Long term psychological damage to a portion of the population is also possible.
Impact on the Economic Condition of the County	The economic viability of the area will depend on not just how much damage was done, but also on how quickly the infrastructure can be repaired; how prepared businesses are to operate in the post disaster environment; how prepared citizens are for the possibility of an attack and its affects; and how well local governments and organizations can respond to the needs of the public for support, cleanup, and if necessary relocation.
Impact on the Public Confidence in Government	Confidence is highly dependent on the public's perception on how well response and recovery are handled during and after an event. A response that shows or gives the impression of preparedness and responsivity to the public's needs and gest services back to full operational capabilities and damage repaired in a timely manner will maintain or enhance public confidence in government.

4.11.2.5 Secondary Hazards

The Colorado State Emergency Operations Plan (SEOP) states that there could be several secondary impacts to terrorism events including transportation and utility disruption, wildfire and urban fires, dam failure, HAZMAT incident, and infectious disease. The potential for secondary impacts emphasizes the need to contain the initial impacts including quick response and good coordination.

4.11.2.6 Future Condition Impacts

Locally, the CSPD will work with state and federal officials to monitor potential threats. The underlying philosophy of the "See Something, Say Something" campaign where everyday citizens can help spot suspicious activity and report it is now widely accepted. Citizens can serve as additional 'eyes and ears'

for law enforcement officials in Colorado who often rely on the instincts and perceptions of citizens to detect activity that is out of the ordinary. Of particular interest is recognition of suspicious behavior such as unauthorized individuals who request sensitive information or take photographs of critical infrastructure or sensitive areas without permission. In highly sensitive areas, cameras can be set up to help provide additional surveillance capability to security teams. Area schools maintain operation manuals for addressing attacks and responses.

Future trends in development will not have a significant impact on this hazard other than population density increases.

4.11.2.7 Issues

Important issues associated with an act of extreme violence in the planning area include the following:

- It is extremely difficult to predict the next incident location.
- The nature of these incidents is dynamic, often catastrophic, and complete within minutes.
- Increased security has an economic cost, as well as in personal freedom and way of life.
- Increased security measures may be unpopular, both politically and socially.
- It is important to understand and identify Positive and Potentially Malicious Uses of Technology (eg social media).
- Soft targets and crowded places are vulnerable to attack and warrant enhanced security.
- The cyber domain and critical infrastructure are significant targets to protect.
- The identification of critical infrastructures is an essential element of an effective anti – terrorism program and efforts must be taken to protect areas that could be exploited. Possible measures include security systems, improved communications and access restrictions.

4.11.3 CYBER-ATTACK

4.11.3.1 Definition and Extent

Cyber-attacks are deliberate attacks on information technology (IT) information systems (IS) and/or data in an attempt to gain illegal access or purposely cause damage. Cyber-attacks are difficult to recognize and typically use malicious code to alter computer data or steal information. The risk of cyber-attacks to IS's is a growing concern as people and institutions become more dependent upon technology that is in a constant state of change with numerous interconnects. The Federal Bureau of Investigation's (FBI) Cyber Division (n.d.) states that "cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated," with implications for private- and public-sector networks".

DEFINITIONS

Cyber Attack: Deliberate attacks on information technology systems to gain illegal access to a computer, or purposely cause damage.

Data Breach: The intentional or unintentional release of secure or private/confidential information to an untrusted environment.

The Colorado Governor's Office of Information Technology defines cyber-attacks as follows: "State of Colorado characterizes information system security or cyber incidents as any event violating State of Colorado security policy, standards, procedures, guidelines, processes or security best practice that may be detected as unexplained network or system behavior resulting in the loss of sensitive data or any instance where State of Colorado's reputation might suffer." This may include unauthorized disclosures of information, increased access to informational assets, corruption of information, denial of service, and theft of state information technology or telecommunications assets, services, or resources.

There are many types of cyber-attacks, examples of common cyber-attacks and their impacts are listed in Table 4-75.

Table 4-75: Common Cyber Attacks and Their Impacts

Type	Impact
Malware (ransomware, spyware, viruses, worms) Malicious software used by attackers to breach a network through a vulnerability, such as clicking a link, that automatically downloads the software to the computer.	• Blocks legitimate access to components of the network • Installs additional harmful software • Obtains information by transmitting data from the hard drive • Disrupts components and makes the system inoperable
Phishing Fake communications (typically through email) appearing to be from a trustworthy source that allow hackers to obtain login information or install malware on a computer when someone interacts with their message.	• Obtains a person's confidential information for financial gain • Obtains employee log-in credentials to attack a specific company • Installs malware onto a computer
Man-in-the-middle attack (MitM) Attackers insert themselves into a two-party transaction. Common points of entry include unsecure public Wi-Fi networks and computers affected with malware.	• Interrupts a transaction to steal personal data
Denial-of-service attack (DoS) Attackers flood a site host or network with digital traffic until the target site/service cannot respond or crashes completely. A distributed denial of service attack (DDoS) is when multiple machines are used to attack a single target. Botnets, which are networks of devices that are infected with malware, are often used in DDoS attacks.	• Legitimate users cannot access websites, online services, or devices • Slows down network performance
Structured Query Language (SQL) injection Attackers use malicious code on vulnerable servers to force the server to reveal information. Can be done by submitting malicious code into vulnerable search boxes on websites.	• Obtains contents of an entire database, including sensitive information • Allows attackers to modify and delete records in a database
Zero-day exploit Attackers hack a network vulnerability before it is noticed and fixed by a patch or permanent solution.	• Allows attacker to plant malware into a system without the victim knowing

Vishing Fake phone calls to steal money or trick victims into sharing private information. Attackers use personalized information to leverage trust.	• Obtains personal, financial, or operational data
Social Engineering Attackers use human interaction (social skills) to obtain or compromise information about an organization or its computer systems. Phishing and Vishing are examples of social engineering attacks.	• Often enables attackers to gain legitimate, authorized access to confidential information
Supervisory Control and Data Acquisition (SCADA) SCADA are used as a means for monitoring, and remotely controlling, geographically widely distributed processes such as water treatment and distribution, oil and gas pipelines and electrical power transmission and distribution. Attackers may disable or cause damage to the system.	• Obtains control of critical systems

Source: https://www.seattle.gov/Documents/Departments/Emergency/PlansOEM/SHIVA/SHIVAv7.0-Cyber.pdf and https://us-cert.cisa.gov/ncas/tips/ST04-014

Cyber-attacks may be carried out by a variety of actors, which may be external, internal, and partners to the organization, agency, institution, or business. According to the Verizon Enterprise Solution's 2019 Data Breach Investigation Report (DBIR), the highest proportion of attacks are carried out by external actors. The DBIR also identified that the majority of data breaches, 49 percent, involve small businesses, 18 percent involve public sector entities, 15 percent healthcare organizations, and 10 percent involve the financial industry. The report also found that 86 percent of breaches were financially motivated.

Cyber disruptions can be intentional or unintentional. Unintentional disruptions are more common and occur when a portion of a system fails, whether as a result of coding mistakes, physical failure of hardware, or even solar storm activity. Intentional disruptions are a directed attack and pose a serious threat to disrupt daily operations and capabilities.

4.11.3.2 Previous Occurrences

Statescoop maintains a timeline of known public-sector ransomware attacks reported in the United States since 2013. Among the 378 incidents identified, five were reported in Colorado, including attacks targeting Sheridan School District 2, Englewood, Lafayette, the Denver Public Library and the Colorado Department of Transportation. Two of these events are described in detail below.

In **February 2018**, the Colorado Department of Transportation (CDOT) server was infected by SamSam malware. Malware found an entrance and used the server's administrative privileges to penetrate the rest of CDOT network. The ransomware, in total, infected 1,274 laptops, 427 desktops, 339 servers, 158 databases, 154 software applications and all voice-over-IP phones used by CDOT at 200 locations across the state. It knocked the department's internal business systems, including finance and payroll operations, off-line. The incident was declared a statewide emergency by Governor Hickenlooper on March 1, 2018. This was the first time any state used a disaster declaration for a cyber-attack.

On **July 2020**, Lafayette officials announced the city was hit with a ransomware attack on the city's computer system. The attack disabled the network causing city emails, phones, online payments and

reservation systems to be affected. City officials paid $45,000 to retrieve the key to unlock the encrypted data.

4.11.3.3 Vulnerability

Water, electricity, transportation, safety services and emergency response, among other critical systems, are all vulnerable to cyber-attack. Cyber-attacks continue to become more sophisticated and an increased threat to people, businesses, institutions, local governments, and state agencies to varying degrees. Large-scale cyber-attacks can destabilize local economies. Smaller jurisdictions may also be hindered by a lower capacity to respond and recover to such attacks.

Table 4-76: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Likely	Limited	Significant	Minimal	Negligible	Moderate
Colorado Springs	Likely	Limited	Significant	Minimal	Negligible	Moderate
El Paso County	Likely	Limited	Significant	Minimal	Negligible	Moderate
Fountain	Likely	Limited	Significant	Minimal	Negligible	Moderate
Green Mtn Falls	Likely	Limited	Significant	Minimal	Negligible	Moderate
Manitou Springs	Likely	Limited	Significant	Minimal	Negligible	Moderate
Monument	Likely	Limited	Significant	Minimal	Negligible	Moderate
Palmer Lake	Likely	Limited	Significant	Minimal	Negligible	Moderate
Ramah	Likely	Limited	Significant	Minimal	Negligible	Moderate
Regionwide	Likely	Limited	Significant	Minimal	Negligible	Moderate

Spatial Extent and Geographic Location

Cyber-attacks are not bounded by any geographic feature and can target any networked computer or system. CHIRRP notes that incidents may involve a single location or multiple geographic areas. A disruption can have far-reaching effects beyond the location of the targeted system; disruptions that occur outside Colorado may impact people, businesses, and institutions within the state.

All jurisdictions in the planning area are vulnerable on some level, directly or indirectly, to a cyber- attack. However, in general, Colorado Springs and El Paso County, may have higher vulnerabilities due to higher concentrations of local, state, and federal facilities. Larger cities like Colorado Springs are also more vulnerable to cyber-attacks because of the higher concentrations of people, businesses, and critical infrastructure.

Probability of Future Occurrence

Cyber-attacks occur daily, but most impacts are negligible or limited. However, it is possible that a cyber-attack could occur that could greatly disrupt operations. Based on historical occurrences and the

increasing digital dependency, it can be assumed that it is **likely**, between 25 and 75 percent annual probability, that the Pikes Peak Region will experience a severe cyber-attack.

Magnitude / Severity

Minor: No anticipated displacement or injuries, minimal disruption on quality of life; little or no property damage; and/or no or brief interruption of essential facilities and services to **Limited:** Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.

Most cyberattacks have negligible or minor impacts; however, it is possible for a cyberattack to have substantial impacts if the data breach is significant enough or if critical, protected information gets into the hands of terrorist groups. One of the primary challenges of cyber-attacks for government and local government partners is the fact that government agencies may not fully understand their vulnerabilities. It also may be difficult to pinpoint when or how a cyberattack initially happens, which can lead to prolonged and extensive attacks in some situations.

Warning Time

Minimal: Less than 6 hours. Cyber-attacks are unpredictable and occur without warning.

Exposure and Losses

➢ Property

Generally, cyber-attacks are not directed against the built environment; however, if water control or transportation devices are hacked, then secondary impacts to property could result.

➢ Population

All individuals, businesses, and other institutions in the planning area are potential targets for cyber-attacks. Potential threats include identify theft, loss of sensitive information, disruption of services, and other malicious activity. A cyber threat that targets critical services and infrastructure could result in injury or death.

➢ Environment

Generally, cyber-attacks will have no direct effect on the environment; however, the environment may be affected if a hazardous materials release occurred because of critical infrastructure failure as a result of an attack.

➢ Critical Facilities and Infrastructure

Cyber-attacks targeted at Supervisory Control and Data Acquisition (SCADA) related utilities can cause severe disruptions to transportation, public safety, and utility services, all of which are critical infrastructure that are highly dependent on information technology.

4.11.3.4 Consequence Analysis

Cyber Attack Consequence Analysis	
Category	**Narrative**
Hazard Description	Cyber-attacks are deliberate attacks on information technology systems in an attempt to gain illegal access to a computer, or purposely cause damage. Cyber-attacks differ by motive, attack type and vector, and perpetrator profile.
Impact to Property, Facilities, and Infrastructure	While some attacks affect only data, physical damage to hardware is possible. Sabotage of utilities and infrastructure could result in system failures that damage property on a scale equal with natural disasters. Facilities and infrastructure may become unusable as a result of a cyber-attack.
Impact on the Environment	While effects of cyber threats on the natural environment would be unlikely, they are conceivable. The effects on the natural environment may come from a system failure that, for example, causes the release of hazardous materials or improper disposal of waste.
Impact on Responders	Cyber-attacks have the potential to interfere with emergency-response communication and activities. Many agencies rely on technology to notify and route responders to the scene of the incident.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	Agencies that rely on electronic backup of critical files are vulnerable. The delivery of services can be impacted since governments rely, to a great extent, upon electronic delivery of services.
Impact on the Public	A cyber-attack could disable the vast majority of systems which control critical infrastructure, traffic control systems, and basic activities. It could also impact personal data and accounts.
Impact on the Economic Condition of the County	Could greatly affect the economy. In an electronic-based commerce society, any disruption to daily activities can have disastrous impacts to the economy. It is difficult to measure the true extent of the impact.
Impact on the Public Confidence in Government	The government's inability to protect confidential personal data would impact confidence. An attack would raise questions regarding the security of using electronic systems for government services.

4.11.3.5 Secondary Hazards

Secondary hazards may include economic, structural or societal harm due to loss of operations, reputation, personal identifying information theft, critical facilities vulnerability and transportation operations impacts. Hackers tampering with election systems is also of concern. Secondary impacts have a high potential to extend beyond those identified due to the highly integrated nature of technology into a diverse range of community systems.

4.11.3.6 Future Condition Impacts

Digital data continues to be the predominant format of data and there are no indications that will change. Therefore, it will be important to closely monitor information systems and provide multi-level protection against potential threats as our technological capabilities expand. The increasing use and reliance on cloud computing and smart metering systems is introducing new security challenges that will require constant monitoring to safeguard user safety and privacy.

4.11.3.7 Issues

Significant issues associated with cyber-attacks include but are not limited to:

- Attacks are not bounded my geographic features and can occur in any location.
- Malicious actors are difficult to identify and apprehend because they can be operating from anywhere in the world.
- Attacks can shut down and/or malfunction critical infrastructure and operations.
- The rapid expansion and utilization of new technologies such as smart metering systems is resulting in new security challenges.

4.11.4 EPIDEMIC/PANDEMIC

4.11.4.1 Definition and Extent

The U.S. Center for Disease Control defines an outbreak as the occurrence of more cases of disease than normally expected within a specific place or group of people over a given period of time. An epidemic is a localized outbreak that spreads rapidly and affects a large number of people or animals in a community. A pandemic is an epidemic that occurs worldwide or over a very large area and affects a large number of people or animals. Because there is little to no pre-existing immunity against the new virus, it spreads worldwide. Generally, pandemic events cause sudden, pervasive illness in all age groups on a global scale. The exact size and extent of the infected population is dependent upon how easily the illness is spread, the mode of transmission, and the amount of contact between the infected and non-infected persons.

DEFINITIONS

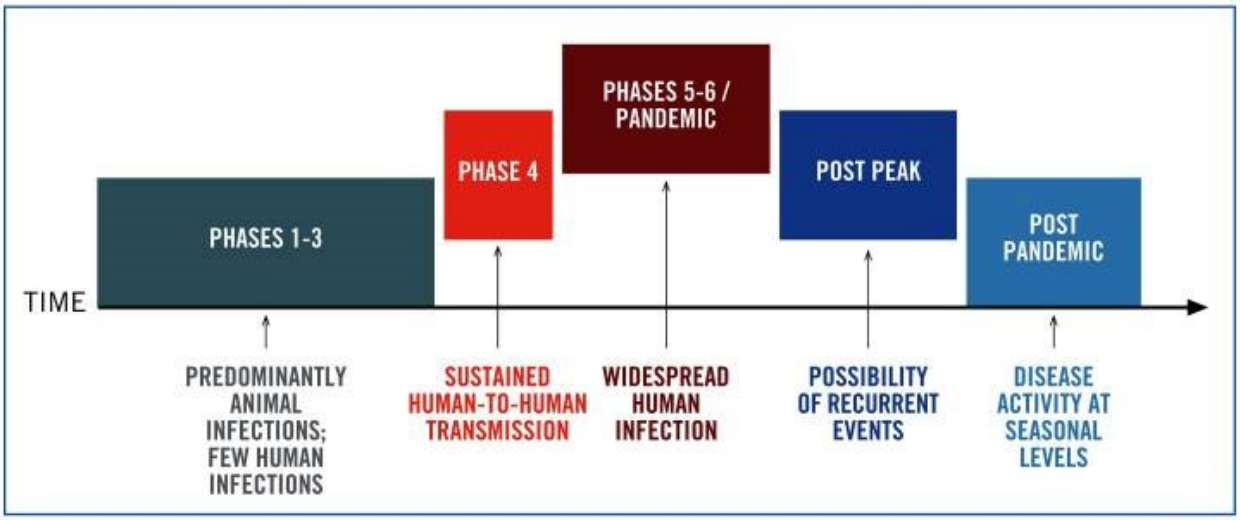
Epidemic/Pandemic: Epidemics occur when an infectious disease spreads beyond a local population, reaching people in a wider geographical area. When that disease reaches global proportions, it is called a pandemic.

Influenza Pandemic: Pandemic influenza results from the emergence of a new influenza A virus to which the population possesses little or no immunity (CDC).

Outbreak: A sudden rise in the number of cases of disease.

Figure 4-63 depicts the World Health Organization's (WHO) six main phases to a pandemic flu as part of their planning guidance. Phases 1-3 correlate with preparedness, Phases 4-6 signal the need for response and mitigation efforts.

Figure 4-63: Pandemic influenza phases, 2009



Source: World Health Organization

Fears of a pandemic have risen in recent years as our globalized economy and growing population fosters large scale international travel and trade. In the United States, the public health system works at the federal, state, and local levels to monitor diseases, plan and prepare for outbreaks, and prevent epidemics where possible. But, in the age of air travel and worldwide shipping, it is becoming increasingly difficult to contain localized outbreaks as infected or exposed people travel and work, sending the disease across the globe in a matter of hours.

According to the CDC, "depending on the overall population effects, a pandemic could overwhelm the capacities of public health and healthcare systems or result in societal disruption because of school or workplace absenteeism, which could affect critical infrastructure," including food systems (Reed C, Biggerstaff M, Finelli L, Koonin LM, Beauvais D, Uzicanin A, et al., 2013).

4.11.4.2 Previous Occurrences

Pandemics have occurred throughout history, but it has only been in the last century that proper records have been kept regarding their cause and origins. The four most serious pandemics that the Centers for Disease Control and Prevention (CDC) has recorded are the result of influenza viruses. These occurred in 1918, 1957, 1968, and 2009 and, more recently, the Novel Coronavirus Disease, COVID 19, was declared a pandemic by the WHO on March 11, 2020. Descriptions of the aforementioned outbreaks are summarized in more detail below. The following descriptions, apart from the Novel Coronavirus, are transcribed from the 2018 Colorado State Hazard Mitigation Plan.

1918 Spanish Flu: In 1918, a powerful strain of the flu, colloquially known as "Spanish Flu," spread throughout the world. The virus was extremely deadly, bringing on pneumonia that filled its victim's lungs with fluid. Worldwide, an estimated 21-50 million people died between 1918 and 1919 as a result of the flu. In Colorado, an estimated 8,000 people were killed by the flu and by complications. The state had one of the highest mortality rates in the country, possibly because of the large population with compromised

lung function, including miners and tubercular patients. It would not be uncommon for terminal patients to request their caretakers to end their life. The 1918 Spanish flu pandemic remains the worst-case pandemic event on record.

1957 Asian Flu: In February 1957, a new influenza A (H2N2) virus emerged in East Asia, triggering a pandemic ("Asian Flu"). This H2N2 virus was comprised of three different genes from an H2N2 virus that originated from an avian influenza A virus, including the H2 hemagglutinin and the N2 neuraminidase genes. It was first reported in Singapore in February 1957, Hong Kong in April 1957, and in coastal cities in the United States in summer 1957. The estimated number of deaths was 1.1 million worldwide and 116,000 in the United States.

1968 Hong Kong Flu: The 1968 pandemic was caused by an Influenza A (H3N2) virus comprised of two genes from an avian Influenza A virus, including a new H3 hemagglutinin, but also contained the N2 neuraminidase from the 1957 H2N2 virus. It was first noted in the United States in September 1968. The estimated number of deaths was one million worldwide and about 100,000 in the United States. Most excess deaths were in people 65 years and older. The H3N2 virus continues to circulate worldwide as a seasonal Influenza A virus. Seasonal H3N2 viruses, which are associated with severe illness in older people, undergo regular antigenic drift.

2009 Pandemic Flu: In the spring of 2009, a new version of the H1N1 virus emerged. This version, due to its genetic lineage, became known as Swine Flu. By June, the Centers for Disease Control and Prevention (CDC) had stopped counting cases and declared it a pandemic. The CDC estimated that there were 60.8 million cases, 274,304 hospitalizations, and 12,469 deaths throughout the United States.

In Colorado, there had been 2,041 hospitalizations across 54 counties by May of 2010. A total of 69 people died. Unlike most other pandemics, deaths were fairly spread out amongst all age groups, with younger generations taking more of the brunt. This is likely because older generations had been exposed to another version of H1N1 at some point in their lives, giving them some immunity, while those who were younger had no existing immunity. Of those who were hospitalized, the CDC estimated that about 70 percent of them belonged to a high-risk group, meaning they likely had existing complications that only compounded the illness.

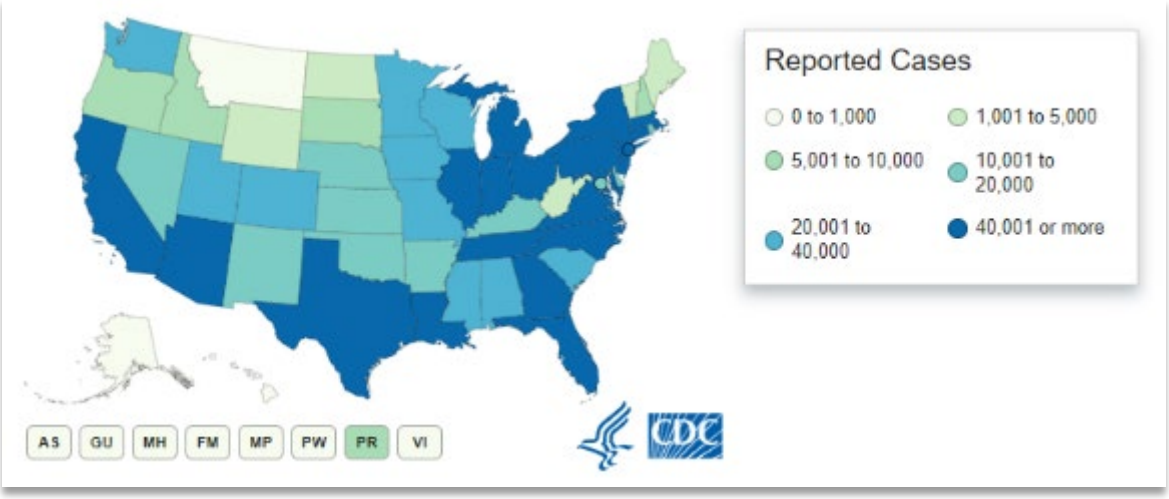
2019 Novel Coronavirus (COVID-19): In December 2019, a newly discovered coronavirus (SARS-CoV-2) was first identified in Wuhan, China, and subsequently spread worldwide. "The virus is thought to be a spillover of an animal coronavirus, likely bats, and later adapted the ability of human-to-human transmission. Because the virus is highly contagious, it rapidly spreads and continuously evolves in the human population" (Lui, Kuo, Shih, 2013). While most cases result in mild symptoms, including fever, cough, fatigue and shortness of breath, some progress to pneumonia, acute respiratory distress syndrome, organ-failure, septic shock, and death.

According to the CDC, everyone is at risk for getting COVID-19 if they are exposed to the virus; however, some people are more likely than others to become severely ill. Those at increased risk for severe illness include older adults and people with underlying medical conditions.

As of June 29, 2020, 10 million cases and nearly 500,000 deaths from COVID-19 have been reported globally. The CDC reports that this comes amidst recent record numbers of new cases, with several

countries reporting their highest number of new cases in a 24-hour period. The United States has reported a total of 2,545,250 cases and 126,369 deaths. Within Colorado, El Paso County has reported 2,327 cases (7.2% of state's cases) and 119 deaths. Figure 4-64 reflects the number of Coronavirus cases reported by U.S. states as of June 29, 2020.

Figure 4-64: Coronavirus Cases Reported by U.S. States as of June 29,2020



Source: Centers for Disease Control and Prevention; https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html

4.11.4.3 Vulnerability

Table 4-77: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Colorado Springs	Occasional	Critical	Significant	Maximum	Negligible	Moderate
El Paso County	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Fountain	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Green Mtn Falls	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Manitou Springs	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Monument	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Palmer Lake	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Ramah	Occasional	Critical	Significant	Maximum	Negligible	Moderate
Regionwide	Occasional	Critical	Significant	Maximum	Negligible	Moderate

Spatial Extent and Geographic Location

All of the planning area is susceptible to human health hazards discussed in this chapter. Infectious disease can cause exposure to the planning area from outside the geographic area of the County, that is, El Paso County residents who travel extensively can become exposed to these hazards while abroad and bring the hazard back with them. This makes it difficult to map the extent and location of these hazards in comparison to other hazards such as flooding, dam failure, or wildfire.

In general, jurisdictions that are more densely populated are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction in the region has some vulnerability to pandemic and infectious disease threats.

Probability of Future Occurrence

The Colorado Department of Public Health and Environment (CDPHE) considers a pandemic to be inevitable. However, there is no definite way to predict when a pandemic might happen. However, due to the increase in air travel, growing populations, and the country's aging population, the probability of a communicable disease epidemic or pandemic is increasing.

Based on historic pandemic events in the United States (5 in the last 100 years), probability of a future occurrence is **occasional**, having between 1 to 25 percent annual probability, or a recurrence rate of approximately one event every 20 years.

Magnitude / Severity

Critical: Isolated deaths and/or multiple injuries and illnesses; potential interruption of essential facilities and services for 24-72 hours to **Catastrophic:** Multiple deaths; potential interruption of essential facilities and service for more than 72 hours.

The severity of human health hazards is dependent upon the percentage of the population exposed to these hazards of concern. As exposed populations reach epidemic proportions, the severity can significantly increase. The key to reducing the severity of an infection is capping the exposure so that the percentage of the population exposed does not continue to grow or spread to uninfected populations.

Jurisdictional losses in a pandemic or infectious disease outbreak stem from lost wages and productivity, not losses to buildings or land. Losses are difficult to estimate because the exact rates of absenteeism and cost of treating a widespread disease will depend on the virus or bacterium in question, the availability of vaccination or treatment, and the severity of symptoms.

Warning Time

Maximum: more than 24 hours. An outbreak of disease may occur quickly; however, for it to reach pandemic levels, the spread may take weeks or even months.

Exposure and Losses

Estimated potential losses are difficult to calculate because disease causes little damage to the built environment; damage is generally experienced through public health response, medical costs as well as lost wages by patients and economic losses due to business closures. Therefore, it is assumed that all buildings and facilities are exposed to disease but would experience negligible damage in the occurrence

of an outbreak, but the costs to the public health sector for responding to an outbreak as well as the impact to humans and the economy may be great.

According to the Colorado State Hazard Mitigation Plan, in a severe pandemic, it is expected that absenteeism may reach 40 percent due to illness, the need to care for ill family members, and fear of infection during the peak weeks of a community outbreak. Certain public health measures (closing schools, quarantining household contacts of infected individuals, "snow days") are likely to increase rate of absenteeism.

➢ Property

None of the health hazards addressed in this chapter are considered to have any measurable impact on the built environment in the planning area.

➢ Population

All citizens in the El Paso County planning area could be susceptible to the human health hazards discussed in this chapter. The Colorado State Hazard Mitigation Plan points out that "densely populated areas have the greatest risk of spreading infection because of shared resources and close contacts. El Paso and Denver Counties have the highest base populations in the state. Therefore, it is likely that any pandemic would hit these areas particularly hard."

A large outbreak or epidemic of a communicable disease could have devastating effects on the population. Although risk groups for severe and fatal infections cannot be predicted with certainty, historic evidence suggests that infants and the elderly, persons with chronic illnesses and compromised immune systems, and pregnant women are usually at higher risk of severe symptoms and complications.

Additionally, healthcare workers, public health workers, and other responders (i.e., law enforcement and firefighters) may be at higher risk of exposure and illness than the general population, further straining the pandemic response.

➢ Environment

None of the environment in the planning area is considered to be exposed to the human health hazards discussed in this chapter.

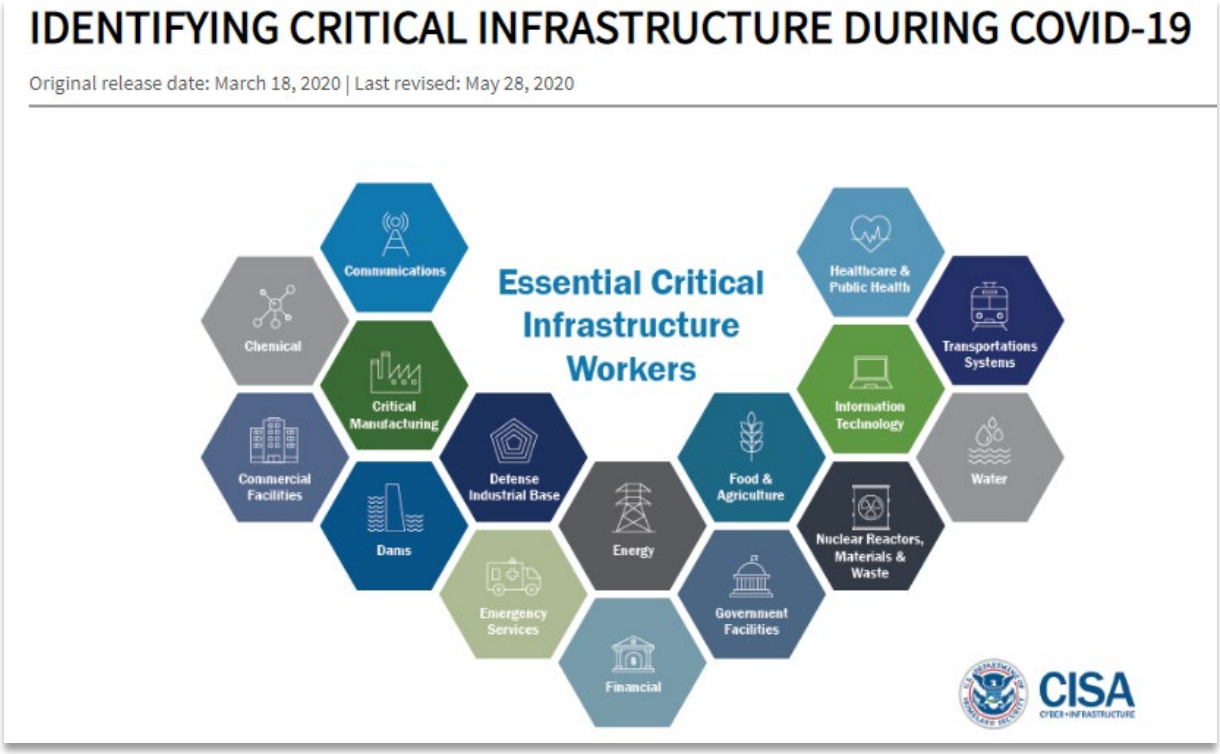
➢ Critical Facilities and Infrastructure

None of the health hazards addressed in this chapter are considered to have any measurable impact on critical facilities in the planning area. However, in the event of a large infectious disease outbreak, "critical facilities face particular challenges due to both the risk of unavailability of key staff through illness or quarantine, as well as other long-term impacts that might affect the ability of the operator to maintain continuous availability" (Uptime Institute Intelligence Team, 2020).

During the COVID-19 outbreak, 16 critical infrastructure sectors were identified by the Cybersecurity & Infrastructure Security Agency (CISA) whose assets, systems, and networks are considered so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national

economic security, national public health or safety, or any combination thereof. Those sectors are shown in Figure 4-65.

Figure 4-65: Critical Infrastructure Sectors and Workforce Identified During COVID-19



Source: Cybersecurity & Infrastructure Security Agency https://www.cisa.gov/identifying-critical-infrastructure-during-covid-19

Outbreaks can be expected to occur simultaneously throughout much of the United States, preventing shifts in human and material resources that usually occur in response to other disasters.

Healthcare facilities (and veterinary clinics) have prepared for the aforementioned health hazards. Emergency management planning incorporates all disciplines responding to an event, (fire agencies, law enforcement, first responder ground and air ambulance agencies, public health, mental and spiritual health). Planning includes identifying shelters, alternate treatment facilities, isolation capacity, and methods to immediately expand physical and human resources.

4.11.4.4 Consequence Analysis

Epidemic/Pandemic Consequence Analysis	
Category	**Narrative**
Hazard Description	Epidemics occur when an infectious disease spreads beyond a local population, reaching people in a wider geographical area. When that disease reaches global proportions, it is called a pandemic. The exact size and extent of the infected

	population is dependent upon how easily the illness is spread, the mode of transmission, and the amount of contact between the infected and non-infected persons.
Impact to Property, Facilities, and Infrastructure	Property, facilities, and infrastructure would not be directly affected by a pandemic. Schools and hospitals will take the brunt of a pandemic. Schools may need to close to halt the spread of the disease. Hospitals will be greatly overburdened during this period because of the influx of new patients. If illness is widespread, then operation of critical facilities may be compromised.
Impact on the Environment	There are not likely to be any environmental effects from a pandemic.
Impact on Responders	Medical staff would be overburdened with hundreds of additional cases on top of their normal workload. All other responders will be impacted in similar proportions to the general public, thereby reducing available responders. Healthcare workers, public health workers, and other responders may be at higher risk of exposure and illness than the general population, further straining the pandemic response.
Impact on Continuity of Operations, Continuity of Government, and Delivery of Services	With a large percentage of the workforce absent, the continuity of government may be severely affected. The state has Continuity of Operations Plans (COOPs) for pandemics that seeks to minimize the amount of time and efficiency lost to a pandemic flu.
Impact on the Public	Unemployment, lost wages, illness & death. Emotional and physiological impact.
Impact on the Economic Condition of the County	In the event a pandemic occurs, a significant portion of the workforce may be unable to work. Government guidance and individual concern will impact in-person commerce. Tourism may be impacted negatively. There will be an impact on the economy, which should be minimized in the regulation and supported in the education.
Impact on the Public Confidence in Government	It is expected that the government will work toward a solution that will end the pandemic, typically by providing guidance and ordered direction, and helping to distribute vaccines and antiviral agents. Government should have a measured response that is appropriate to conditions, ending the pandemic and minimizing the economic impact. Continued public messaging and outreach is vital.

4.11.4.5 Secondary Hazards

Human health hazards are not like natural hazards that have measurable secondary impacts, such as earthquakes, floods, or fires. This is due primarily to that fact that human health hazards do not impact general building stock or critical facilities and infrastructure as other hazards do. The largest secondary impact caused by human health hazards would be economic. Large outbreaks of any human health hazard could reduce the workforce significantly for long periods of time while the infected population recovers from the impacts of the disease and/or while non-essential workforce is in quarantine. Hospitals and health care providers could be overwhelmed as a result of a large influx of patients.

Additionally, secondary impacts could include civil disorder and violence exacerbated by the pandemic as an outcome of fear or as a consequence of the measures taken to contain or control the outbreak.

4.11.4.6 Future Condition Impacts

El Paso County currently has the second highest projected population change between 2010 and 2030. According to the Colorado State Hazard Mitigation plan, by 2030, the County is projected to grow by an additional 227,932 people. This drastically increases the region's risk to pandemics, as there will be far more people who can potentially become ill and can also pass on the disease. Also, as population continues to grow and development expands further into wildland areas, it can mean more potential for transmission of infectious diseases through denser population and more interaction with wild animals.

Future climate scenarios are predicted to be warmer and dryer which could mean the introduction of diseases typically associated with warmer climates. However, ongoing efforts to reduce Colorado's greenhouse gas emissions and adapt to a changing climate, such as the Colorado Climate Plan, will help to reduce the impacts of climate change on pandemics.

The economic impact of a human health hazard could be localized to a single population or could be significant, depending on the number of cases and available resources to care for those affected. Other financial impacts are absorbed or managed by the organization affected (i.e., healthcare facilities and veterinary offices train their personnel at their own cost). The potential for human health hazards is not likely to slow the expected growth in the County.

4.11.4.7 Issues

Important issues associated with pandemic disease include but are not limited to the following:

- Prevention is the key to mitigation of the impacts of these hazards. Prevention through vaccination and abatement will help to reduce the exposure to these hazards.
- Adequately trained and supplied medical personnel must be available.
- Conduct outreach to inform the public about exposure to and prevention of human health hazards.
- Services may be delayed or suspended and unemployment numbers may increase exponentially increase.
- Programs to improve overall health in the community in order to reduce the number of high-risk patients should be adopted.
- Having local medical resources available as federal and state resources may not be available.

4.11.5 MAJOR AIRCRAFT INCIDENT

4.11.5.1 Definition and Extent

Periodic plane crashes are an unfortunate fact of life in mountain regions. Unpredictable, sometimes violent weather and rugged terrain often create a hazard for air travelers, especially those traveling in smaller aircraft. El Paso County's recent history reflects a number of aviation incidents, some fatal, and many of which are concentrated around the county's airports.

El Paso County, like many mountainous areas, demands the best of pilots. El Paso County has eight airports or small airfields. Four are U.S. Military airfields, three are active private airports, and one is a commercial airport. Commercial accidents are rare with the most notable occurring in March 1991 in which Flight 585 crashed while making its final approach to the Colorado Springs Airport, killing 25 people on board. This loss of life was kept to only those on the aircraft due to simple luck, as the plane came down in a park immediately adjacent to an apartment complex and subdivision.

4.11.5.2 Previous Occurrences

Based on historical numbers, the greatest danger for aviation in El Paso County is from small airplanes including those that are privately owned, as well as those that are contracted by the US Air Force Academy and Peterson Air Force Base as part of their Aero Clubs. Weather patterns in the Front Range can change rapidly and, in many cases, can exceed the competency of many pilots. From 2010 to 2018 there was 35 accidents and incidents reports to the National Transportation Safety Board, of those 8 fatalities among four accidents were recorded.

DEFINITIONS

Aircraft Accident: An occurrence associated with the operation of an aircraft, which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

Aircraft Incident: An occurrence other than an accident with the operation of an aircraft, which affects or could affect the safety of operations.

Accident Potential Zones: Rectangular zones extending outward from the ends of active runways that delineate those areas recognized as having the greatest risk of aircraft mishaps.

Part 77 Surfaces: A complex structure of imaginary surfaces in relation to each runway to prevent communities from allowing manmade objects, vegetation, or terrain to extend upward into the airspace used for takeoff, landing, or maneuvering. These two types of airspace were combined to create a zone surrounding each airport that represents the higher probability of aircraft accident. The largest zone surrounds the runways shared by the Colorado Springs Municipal Airport and Peterson Air Force Base, both of which support large instrument-guided airliners, cargo planes, and military jets.

4.11.5.3 Vulnerability

Table 4-78: Risk Score Summary

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	Likely	Limited	Significant	Minimal	Minor	Moderate
Colorado Springs	Likely	Limited	Moderate	Minimal	Minor	Moderate
El Paso County	Likely	Limited	Small	Minimal	Minor	Moderate
Fountain	Likely	Limited	Significant	Minimal	Minor	Moderate
Green Mtn Falls	Occasional	Minor	Negligible	Minimal	Negligible	Low
Manitou Springs	Occasional	Minor	Negligible	Minimal	Negligible	Low
Monument	Likely	Limited	Small	Minimal	Minor	Moderate
Palmer Lake	Occasional	Minor	Negligible	Minimal	Negligible	Low
Ramah	Occasional	Minor	Negligible	Minimal	Negligible	Low
Regionwide	Highly Likely	Limited	Small	Minimal	Minor	Moderate

Spatial Extent and Geographic Location

El Paso County contains eight airports or small airfields:

- **Colorado Springs Municipal Airport**, a regional commercial airport, is co-located with **Peterson Air Force Base**. Most of the County's air traffic, and the largest aircraft, fly in and out of these facilities (90 arrivals and departures per day at the Colorado Springs Airport). These facilities support large commercial passenger and cargo planes, and very large military aircraft.
- **U.S. Air Force Academy**: A small airport mostly used for training flights is located on the Academy grounds. The Academy's very small **Bullseye** airstrip is located in far eastern El Paso County. **Aardvark** Auxiliary Airfield is located on the Academy's main property. Aardvark Auxiliary Airfield was closed in 2008 and is no longer an active runway for flight operations. The runway is currently used for cadet training with remotely piloted aircraft.
- **Fort Carson Butts Airfield**: A small airport used for an increasing number of training flights.
- **Small private airports**: Meadowlake, Calhan, and Springs East.

Although all areas of the County are potentially at risk from airplane crashes. County dispatch records show that most airplane crashes occur on or near airports. Airport locations within El Paso County and the corresponding Part 77 surface areas are depicted in Figure 4-66. Population density within the Airport Accident and Part 77 surface areas is also shown. Table 4-79 identifies the acreage and percent of area within each jurisdiction exposed to Airport Accident and Part 77 surface areas.

Figure 4-66: Airport Accident and Part 77 Zones

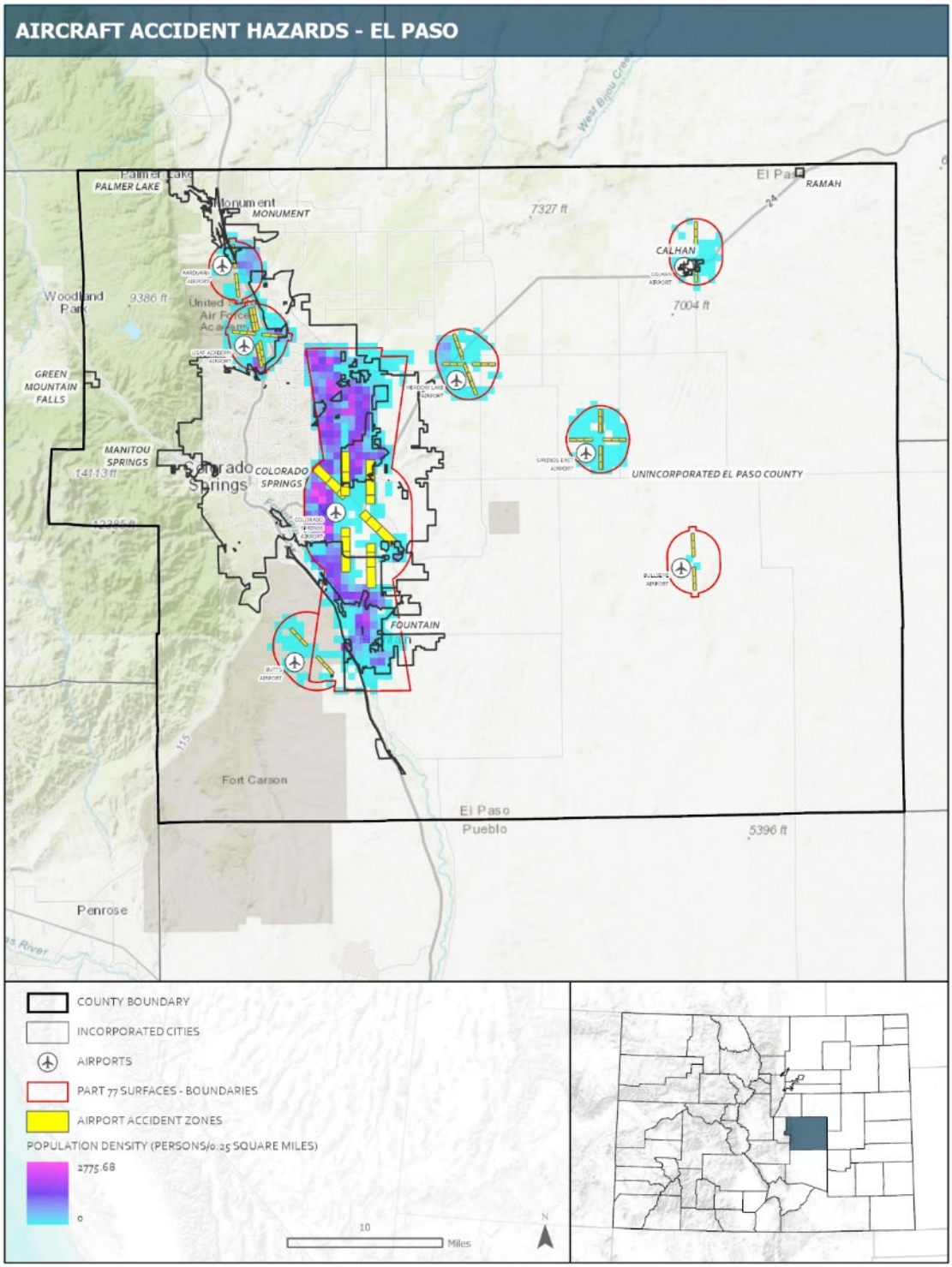


Table 4-79: Acreage and Percent of Area Exposed to Airport Accident and Part 77 Zones

Jurisdiction	Total Area Exposed (Acres)	Total Area Exposed (%)
Calhan	505	100%
Colorado Springs	44,896	36%
El Paso County	79,445	6.5%
Fountain	10,507	74%
Green Mountain Falls	0	0%
Manitou Springs	0	0%
Monument	752	17%
Palmer Lake	0	0%
Ramah	0	0%
Regionwide	**136,105**	**10%**

Probability of Future Occurrence

The National Transportation Safety Board, from 2010 to 2018, reported 35 incidents and accidents within El Paso County. This is slightly less than five per year; therefore, the probability of the typical light airplane crash is **highly likely** to happen every year. Aircraft accidents have and will continue to be a danger to residents in the County. The great danger would be a commercial aircraft crash in a highly populated area. Although airport operations at Colorado Springs Airport have decreased, the impact of a crash is increasing due to the number of residents and businesses being built in the departure and approach path for flights.

Magnitude / Severity

When considering community risk, airplane crashes are similar to earthquakes. In El Paso County, most airplane crashes are small; however, although a major aircraft accident is extremely rare, the potential for a crash must be considered. As noted, from 2010 to 2018 there were 8 total deaths recorded in four accidents.

The number of fatalities associated with light airplane crashes is low, compared to the 497 deaths from automobile crashes in the County between 2010 and 2018 (National Highway Traffic Safety Administration). Thus, from the perspective of community risk, the severity of the County's "typical" airplane crash is **limited** with minor to significant injuries and minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for more than 24 hours to **critical** with isolated deaths and/or multiple injuries, major long-term property damage that threatens structural stability, and interruption of essential facilities and services for 24-72 hours.

Figure 4-67: Private Aircraft Crash December 2006, Non-Fatal

Significant aircraft accident

The County has experienced one severe commercial aviation accident. On March 3, 1991, United Airlines Flight 585 crashed into Widefield, an unincorporated area, while making its final approach to the Colorado Springs Municipal Airport. The Boeing 737 went down four miles short of the runway, killing all 25 people on board. The loss of life was limited to those on the aircraft because the plane came down in Widefield Park, missing a nearby apartment complex and subdivision. With an expanding community and the associated increase of aircraft activity, the corresponding potential for a significant incident cannot be overlooked, while keeping in mind that commercial carrier accidents are infrequent.

Military aircraft accident

One incident that occurred in the nearby area and received nationwide attention happened in April, 1997 when an A10 Warthog carrying four 500-pound bombs, veered off course from a training mission in Arizona and was tracked by radar and visual sightings to the vicinity of New York Mountain. Another incident occurred in June of 2016 with the crash of a Thunderbird fighter jet near Colorado Springs. The crash was caused by a throttle malfunction that cut off fuel to the engine. No one on the ground, nor the pilot was injured. Events such as these are spectacular and command headlines for a time, but are rare in the planning area. The impact of a military accident varies depending on the type of incident but in most cases the impact is **limited to critical**.

Warning Time

Minimal: Warning time is less than 6 hours. Aircraft accidents often offer little to no warning prior to the onset of events as they take place during takeoff or landing. When there is some warning, it is possible to significantly change the outcome in most occasions by diverting flight paths to less populated areas or staging rescue equipment.

Exposure and Losses

- **Property**

Due to the relatively contained nature of a typical aircraft accident in El Paso County, significant property damage or loss is not likely. There are some major aerospace facilities located on, or in close proximity to the Colorado Springs Municipal Airport that could incur significant economic loss.

Loss estimates were developed representing 10 percent, 30 percent, 50 percent and 100 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 4-80 lists the loss estimates for the general building stock for jurisdictions that have an exposure to Accident Potential Zones and Part 77 Areas. Ninety-one percent of the 82,920 structures exposed to Accident Potential Zones and Part 77 Areas are residential.

Table 4-80: Loss Estimate for the General Building Stock for Jurisdictions that have an Exposure to Accident Potential Zones and Part 77 Areas

Jurisdiction	Total Exposed Structure Count	Total Exposed Structure (%)	Estimated Loss Potential			
			10% Damage	30% Damage	50% Damage	100% Damage
Calhan	511	100%	$5,845,421	$17,536,263	$29,227,106	$58,454,211
Colorado Springs	45,539	33%	$1,485,622,514	$4,456,867,542	$7,428,112,571	$14,856,225,141
El Paso County	27,912	38%	$692,666,612	$2,077,999,836	$3,463,333,060	$6,926,666,120
Fountain	8,594	99%	$200,896,303	$602,688,909	$1,004,481,515	$2,008,963,030
Monument	364	15%	$17,772,262	$53,316,787	$88,861,311	$177,722,622
Regionwide	**82,920**	**36%**	**$2,402,803,112**	**$7,208,409,337**	**$12,014,015,562**	**$24,028,031,124**

➢ Population

It can be reasonably assumed that the entire planning area is exposed to some extent to the potential for aircraft accidents. It is much more likely, however, that El Paso County will continue to see the vast majority of incident occurrences near active airport facilities. There are 250,866 people living within the Accident Potential Zones and the Part 77 Areas.

Risk for direct impact of an aircraft accident increases within Accident Potential zones and Part 77 Areas due to the increased aircraft operations. Table 4-81 lists population living within the identified hazard areas. The second group of persons at risk is the operators and passengers. While pinpointing a location of an accident is difficult, those onboard at the time of the incident are the only persons guaranteed to be directly impacted.

Table 4-81: Population within Accident Potential Zones and Part 77 Areas

	Total Exposed Population Count	Exposed Population (%)
Calhan	502	100%
Colorado Springs	147,102	35%
El Paso County	76,491	48%
Fountain	25,853	100%

Green Mtn Falls	0	0%
Manitou Springs	0	0%
Monument	919	17%
Palmer Lake	0	0%
Ramah	0	0%
Regionwide	**250,866**	**41%**

➢ Environment

Secondary hazards associated with aircraft accidents that will likely have some of the most damaging effects on the environment are fire (structure or wildland) and hazardous materials releases. Hazardous materials releases and fire can significantly impact surrounding habitat.

➢ Critical Facilities and Infrastructure

The most likely critical facilities exposed to aircraft accident risk are the eight airfields as this is the most likely area where an aircraft accident will occur. It is unlikely that an aircraft accident will have direct effect on most critical infrastructure within the planning area. The most common problem associated with this hazard are utility losses or potential transportation restrictions.

4.11.5.4 Consequence Analysis

Aircraft Incident Consequence Analysis	
Category	**Narrative**
Hazard Description	El Paso County's recent history reflects a number of aviation incidents, some fatal, and many of which are concentrated around regional airports.
Impact to Property, Facilities, and Infrastructure	The most vulnerable property, facilities, and infrastructure are those closest to airports. Impact can range from limited with minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for no more than 24 hours to critical with major long-term property damage that threatens structural stability and interruption of essential facilities and services for 24-72 hours. It is unlikely that an aircraft accident will have direct effect on most critical infrastructure within the planning area. The most common problem associated with this hazard are utility losses or potential transportation restrictions.
Impact on the Environment	Hazardous materials releases and fire resulting from an aircraft accident can significantly impact surrounding habitat.
Impact on Responders	Exposure exists to personnel performing routine duties when event occurs. High risk potential from fires involving Class A, B, C, or D materials, toxic fumes and smoke from combustion of aircraft fuel, and explosive hazards.
Impact on Continuity of Operations, Continuity of	None or limited loss of facilities, infrastructure function, accessibility, or ability to provide services.

Government, and Delivery of Services	
Impact on the Public	Impact is limited with minor to significant injuries to critical with isolated deaths and/or multiple injuries. Risk for direct impact of an aircraft accident increases within Accident Potential zones and Part 77 Areas due to the increased aircraft operations.
Impact on the Economic Condition of the County	None or limited economic impact. However, should an aircraft incident occur within a heavily populated area, the damage [and impact on the economy] could be devastating.
Impact on the Public Confidence in Government	Confidence is highly dependent on the public's perception on how well response and recovery are handled during and after an event. Communication is important to maintain public trust and reduce social panic.

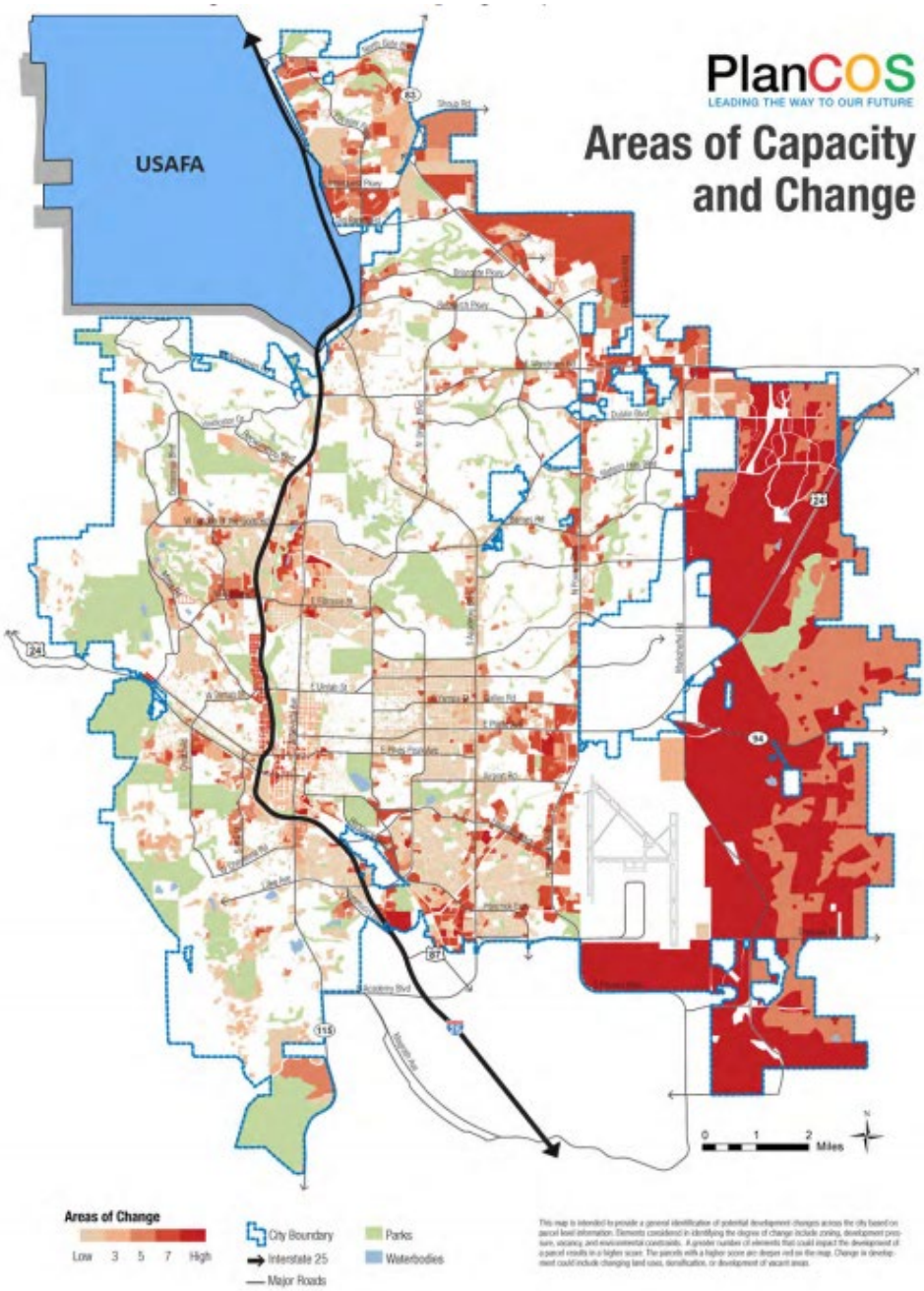
4.11.5.5 Secondary Hazards

The most significant secondary hazards associated with aircraft accidents are structure fire, wildfire, and hazardous materials releases.

4.11.5.6 Future Condition Impacts

It is expected that the population residing within the Accident Potential Zones and the Part 77 Areas will continue to grow due to development within these areas, especially in the areas surrounding the Colorado Springs Municipal Airport and lands adjacent to the U.S. Air Force Academy (Figure 4-68: Colorado Springs Projected Growth Areas).

Figure 4-68: Colorado Springs Projected Growth Areas



Source:
https://www.usafa.af.mil/Portals/21/documents/10ABW/CES/USAFA_AICUZ_Study_2019_Final_high_quality.pdf?ver=2019-07-22-090803-320

The Monument planning department developed and administers its 2017 Town of Monument Comprehensive Plan. This plan does not specifically address land use compatibility issues with the Air Force Academy along the shared, approximately 900 feet long, boundary. Although the immediate vicinity (approximately 1,600 feet north of Aardvark Airfield) to the Academy is zoned for planned industrial

development, it is available for rezoning under planned unit development, which allows for mixed-use residential.

4.11.5.7 Issues

Important issues associated with an aircraft accident in the planning area include the following:

- It is difficult to predict the next accident location.
- Military flights in the planning area will increase.
- Populations within the Accident Potential Zones and the Part 77 Areas will continue to grow.
- For land use and planning, considerations should be made for what is a compatible land use near an airport.

Chapter 5 | Mitigation Strategy

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Chapter 5 | Mitigation Strategy

Plan Requirements

FEMA Requirements

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

44 CFR Requirement §201.6(c)(3)(i): The mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. The mitigation strategy must also address the jurisdictions' participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

44 CFR Requirement §201.6(c)(3)(iii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.

EMAP Standards (2019)

Standard 4.2.1: The Emergency Management Program has a plan to implement mitigation projects and sets priorities based upon loss reduction. The plan: (1) is based on the natural and human-caused hazards identified in Standard 4.1.1 and the risk and consequences of those hazards; (2) is developed through formal planning processes involving Emergency Management Program stakeholders; and (3) establishes short and long-term strategies, actions, goals, and objectives.

Standard 4.2.2: The Emergency Management Program documents project ranking based upon the greatest opportunity for loss reduction and documents how specific mitigation actions contribute to overall risk reduction.

Standard 4.2.4: The Emergency Management Program, consistent with the scope of the mitigation program, does the following: (1) identifies ongoing mitigation opportunities and tracks repetitive loss; (2) provides technical assistance in implementing mitigation codes and ordinances; and (3) participates in jurisdictional and multi-jurisdictional mitigation efforts.

This chapter describes the updated mitigation strategy developed by the LPC based on the risk assessment detailed in Chapter 4 and through the planning process detailed in Chapter 2.

5.1 HAZARD IDENTIFICATION

Mitigation strategies from the 2017 Manitou Springs HMP, the 2015 El Paso County HMP, and the 2016 Colorado Springs HMP were reviewed, revised and integrated through a collaborative process during LPC meetings and supplemented with one-on-one conversations with participating jurisdictions as necessary. The mitigation strategy consists of the overall strategy statements, goals, objectives and mitigation actions. Mitigation strategy collaboration opportunities are detailed in Chapter 1, a summary is provided below.

Mitigation strategy collaboration opportunities included:

- LPC Meetings on February 25 and June 22, 2020 - see Appendix B for full list of participants.
- Survey for input with 52 respondents – see Appendix B for full summary of survey results.
- Coordination with El Paso County Master Plan Update and draft zoning considerations, meeting held on June 15, 2020.
- Coordination with Subject Matter Experts including, but not limited to Colorado Springs Utilities, the El Paso County HAZMAT coordination team, and El Paso County information technology staff.
- On August 31 and September 4, 2020 email requests were sent to partnering jurisdictions to review and update community profile and capability assessment sections.
- A request was sent to partnering jurisdictions and responsible parties to review current mitigation actions and propose new and/or updated actions if needed – See Appendix B for local municipality input.

5.2 MITIGATION PRINCIPLES, GOALS, AND OBJECTIVES

The following mitigation guiding principles, goals and objectives are a reflection of the collaborative input from the Planning Team as outlined in the engagement opportunities in section 5.1. These are blended and revised from the prior Manitou Springs, El Paso County, and Colorado Springs Hazard Mitigation Plans to form the Pikes Peak Region mitigation guiding principles, goals and objectives. These goals and objectives are supportive of the comprehensive range of mitigation action types needed to reduce vulnerability from hazards. Several of the goals from Manitou Springs align closely with the goals listed in this plan and 17 of the new actions provided from Manitou Springs are directly from their current Hazard Mitigation Plan. Additionally, Manitou Springs has identified additional community specific goals that can be found in their planning document.

GUIDING PRINCIPLES:

- Reduce or eliminate risks to life safety and property in the Pikes Peak Region from natural and human-caused hazards, incidents/events.
- Sustain successful measures that reduce exposure to future disaster losses and implement other measures that strengthen the disaster preparedness of the community.

- Institute pro-active comprehensive preparedness and mitigation programs involving government entities, in partnership with other agencies, other partners, and the public to reduce the effects of a disaster as well as reduce the time and resources required for response and recovery.

GOALS AND OBJECTIVES:

Goal 1: Reduce loss of life and injury

- **Objective 1.1:** Assess and improve existing emergency notification systems to ensure reliable, diverse and redundant public communication of potential hazards
- **Objective 1.2**: Ensure all municipalities within the region have a well prepared, implementable, and vetted emergency operations plan
- **Objective 1.3:** Review and assess region, county and local plans for current best practices, standards, and appropriate integration of risk reduction elements resulting in a more resilient community
- **Objective 1.4:** Assess and improve hazard-specific mapping and warning systems associated with high risk hazards to provide accurate and accessible information to ensure that citizens and visitors can respond appropriately

Goal 2: Reduce property and economic losses

- **Objective 2.1:** Proactively protect and reduce vulnerability of critical facilities, infrastructure, and other key community assets from hazards
- **Objective 2.2:** Develop and implement strategies that make public and private properties more resistant to the impact of hazard events and explore potential incentives for businesses and residents to improve disaster resistance
- **Objective 2.3:** Facilitate businesses within the region in developing and maintaining Continuity of Operations Plans
- **Objective 2.4:** Identify federal, state and other local legislation that impacts emergency management activities
- **Objective 2.5:** Leverage financial assistance and other resources to strengthen the County's disaster resiliency.

Goal 3: Enhance communication of risks and threats in Pikes Peak Region to empower personal preparedness and responsibility

- **Objective 3.1:** Improve community education programs to increase awareness of hazards and mitigation opportunities to reduce personal risk to citizens
- **Objective 3.2:** Identify creative and alternative cost-effective methods to provide multiple public education forums to teach citizens how to mitigate natural hazards on their property
- **Objective 3.3:** Take proactive steps to ensure businesses and residents have information regarding necessary resources available to them pre, during and post an event

Goal 4: Improve collaboration and cooperation throughout El Paso and partnering jurisdictions

- **Objective 4.1:** Develop and implement strategies to improve communication and coordination of mitigation activities between federal, state and local governments, as well as private and non-profit organizations
- **Objective 4.2:** Increase the level of coordination between all stakeholders in order to effectively and efficiently implement preparedness and mitigation strategies
- **Objective 4.3:** Establish multi-jurisdictional methodologies and inter-operability to allow better information sharing and resource tracking

Goal 5: Incorporate hazard mitigation into future plans and policies

- **Objective 5.1:** Incorporate hazard analysis and emergency preparedness planning into regional, county and local future development planning
- **Objective 5.2:** Integrate mitigation priorities with watershed and storm water planning, natural resource management, and sound land use planning to protect life, property and the environment
- **Objective 5.3:** Implement the All-Hazard Mitigation Plan proactively and effectively by clearly communicating the process for plan implementation, maintenance and updates
- **Objective 5.4:** Continue to improve the regulatory review process for development and construction in the vicinity of known hazard areas.

Goal 6: Continuity of government services and business operations

- **Objective 6.1:** Identify needs and leverage available funding streams to improve public safety, response, and recovery programs to ensure essential services can be maintained
- **Objective 6.2:** Develop effective primary and alternate emergency operations facilities to facilitate effective incident/event support
- **Objective 6.3:** Partner with local businesses, Chamber of Commerce and Non-Governmental Organizations (NGOs) that provide critical services to residents to ensure continuity of services and a coordinated response

5.3 MITIGATION ACTIONS

Based on the findings of the Risk Assessment, input from the public, and professional experience of the LPC, potential actions were identified that roughly followed the categories below.

- Local Plans and Regulations (LPR) – These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.
- Property Protection - Actions that involve the modification of existing structures or infrastructure to protect them from a hazard or remove them from the hazard area.
- Structural – Actions that involve the construction of structures or infrastructure to reduce the impact of hazard.

- Natural Systems Protection (NSP) – These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.
- Emergency Services – Actions that ensure the continuity of emergency operations.
- Education and Awareness Programs (EAP) – These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

Mitigation actions were developed based on risk assessment-identified hazards; and actions were characterized as short and long-term and prioritized; thus, meeting the intent of EMAP Standards 4.2.1, 4.2.2, and 4.2.4. Information pertaining to lead and supporting entities, estimated cost, timeframe, and status of the action is also provided.

Priority is dependent on alignment with:

- Goals and priorities for the community;
- Hazard exposure and the proposed action's ability to reduce exposure to the community;
- The identified risk score;
- Community input guiding these decisions and responsivity to the local community needs.

The estimated costs for the mitigation initiatives were identified as high, medium, or low, using the following ranges:

- Low – less than $10,000
- Medium – from $10,000 to $100,000
- High – greater than $100,000.

The parameters for the timeline were identified as short-term, long-term, ongoing, using the following ranges:

- Short Term - to be completed in 1 to 5 years
- Long Term - to be completed in greater than 5 years
- Ongoing - currently being funded and implemented under existing programs.

The status of each action is identified as either new, in progress, not started, or ongoing.

- New – new action identified for 2020 plan update.
- In progress – carried over from previous plan(s) and completion/implementation of action is underway.
- Not started – carried over from previous plan(s) but implementation of action has not commenced.
- Ongoing – Carried over from previous plan(s) and is a reoccurring initiative.

Table 5-2 lists the recommended countywide and jurisdiction specific initiatives. Completed and removed actions from the previous plan are found in Appendix D. Potential sources of funding to implement identified mitigation actions contained within the HMP are noted in Table 5-1.

Table 5-1: Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
LOCAL		
EPC General Fund	El Paso County Board of County Commissioners	Funding available for mitigation efforts supporting government-wide projects and activities.
EPC Capital Improvements Fund	El Paso County Public Works Department	Funding available for the construction of new infrastructure, infrastructure improvements, and critical infrastructure protection.
COS General Fund Capital Improvement Program	Various City Departments	Funding is allocated to the Capital Improvement Program for the purpose of building and maintaining capital facilities, roads, bridges, parks, and other public buildings to facilitate service delivery, including mitigation efforts. Each year, funding is assigned to prioritized projects across the City organization for inclusion in the annual budget.
COS Stormwater Enterprise	Stormwater Enterprise	The Stormwater Enterprise's primary focus is to implement a program to responsibly manage the City's stormwater system. This includes stormwater capital construction projects, stormwater infrastructure maintenance, as well as mitigation measures incorporated into those projects.
COS Grants Fund	Various City Departments	Grant funding supports local capital improvement projects, local government operations, and disaster recovery efforts—these funds are designated specifically to projects and improvements in line with the intent of the grantor.
Town of Calhan	N/A	Relies upon local and regional support when made available in a post-disaster environment
City of Fountain General Fund	City Council	Funding available for mitigation efforts supporting government-wide projects and activities.
City of Fountain General Fund Capital Improvements Program	Various Departments	Funding is allocated to each General Fund department's Capital Improvement Program for the purpose of building and maintaining capital facilities, roads, bridges, parks, and other public buildings to facilitate service delivery including mitigation efforts. Each year, funding is assigned to prioritized projects across the City organization for inclusion in the annual budget.
City of Fountain Water Utility Enterprise Fund	City Council	The Water Utility Enterprise's primary focus is to responsibly manage, operate, and maintain the City's water system infrastructure. This includes capital construction projects, infrastructure operations and maintenance, as well as mitigation measures incorporated into those projects.
City of Fountain Drainage Fund	City Council	The Drainage Fund dollars are assigned each year as part of the annual budget process for the regular maintenance of existing storm water drainage infrastructure, including mitigation measures and inspections for the construction, mitigation, and maintenance of privately owned and operated drainage facilities withing City boundaries.
Town of Green Mountain Falls Fire Mitigation Fund	Various Departments	Fund dedicated to fire mitigation efforts in 2021
Manitou Springs General Fund	Finance Director	Funding has been used in the past for the local match for hazard mitigation projects.
Manitou Springs Storm Drainage Enterprise Fund	Public Works Director	This funding supports flood mitigation projects, EPA storm water program monitoring and compliance, flood recovery costs, and improvements to/maintenance of the stormwater management system.
Manitou Springs Water Enterprise Fund	Public Works Director	Funding could be used for hazard mitigation dealing with the reservoir, water treatment plant and water lines.
Manitou Springs Conservation Trust	Public Works Director	Funding could be used for hazard mitigation in City parks.

Funding Source	Fund Administrator	Description
Fund		
Manitou Springs Open Space Fund	Planning Director	This fund is for the acquisition and maintenance of City open space. Funding could be used for mitigation of City trails and open space.
Town of Monument	N/A	Relies upon local and regional support when made available in a post-disaster environment
Town of Palmer Lake	N/A	Relies upon local and regional support when made available in a post-disaster environment
Town of Ramah	N/A	Relies upon local and regional support when made available in a post-disaster environment
FEDERAL		
Building Resilient Infrastructure and Communities (BRIC) Program	Federal Emergency Management Agency (FEMA)/Colorado Division of Homeland Security and Emergency Management (DHSEM)	Authorized by the Disaster Relief and Recovery Act of 2018, the BRIC program is replacing FEMA's Pre-Disaster Mitigation Program. BRIC will support states, local communities, tribes and territories as they undertake projects that mitigate hazard risks and increase community resiliency. Grant awards will prioritize infrastructure projects and projects that support community lifelines: safety and security; food, water, shelter; health and medical; energy; communications; transportation; and hazardous material. https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
Hazard Mitigation Grant Program	DHSEM	Post-disaster funds to hazard reduction projects impacted by recent disasters. https://www.fema.gov/grants/mitigation
Flood Mitigation Assistance Program	DHSEM	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by flooding. Provides funding to support development of the flooding hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the NFIP. https://www.fema.gov/grants/mitigation/floods
Community Development Block Grant Program	US Department of Housing and Urban Development/ Colorado Department of Local Affairs (DOLA)	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare. https://www.hudexchange.info/programs/cdbg/
Emergency Management Performance Grants Program	FEMA/ DHSEM	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects. https://www.fema.gov/grants/preparedness/emergency-management-performance
National Earthquake Hazards Reduction Program (NEHRP)	Colorado Geological Survey (CGS)	Supports enhanced earthquake risk assessments in local HMPs. Provides funding for earthquake modeling and loss estimation, partnership building, planning, and training activities. Provides funding for prevention materials and activities. Provides support for limited post-event inspection and reporting. https://www.nehrp.gov/contracts/index.htm
State Fire Assistance Program	US Forest Service (USFS)/ DHSEM	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels. https://www.fs.usda.gov/working-with-us/partnerships
National Dam Safety Program State Assistance Grants	FEMA/DWR Dam Safety	Provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. https://www.fema.gov/emergency-managers/risk-management/dam-safety/grants

Funding Source	Fund Administrator	Description
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation planning, and outreach and support. https://www.fema.gov/flood-maps/tools-resources/risk-map
STATE		
Flood & Drought Response Fund	Colorado Water Conservation Board (CWCB)	Created and appropriated funding to the Flood Response Fund, administered by CWCB. https://cwcb.colorado.gov/flood-drought-response-fund
Emergency Dam Repair Cash Fund	CWCB	As determined by CWCB, money is transferred from the CWCB Construction Fund to the Emergency Dam Repair Cash Fund as needed. https://dnrweblink.state.co.us/cwcb/0/edoc/210456/37-60-122_5.pdf?searchid=38cbabbb-575d-460d-9ddb-aa38c36bca8a
Colorado Flood and Drought Response Fund	CWCB	This is not a formal grant program, with established guidelines or timelines or applications. It is by design an as-needed program to react to circumstances and is administered by Kevin Houck and Megan Holcomb. https://cwcb.colorado.gov/flood-drought-response-fund
Colorado Healthy Rivers Fund	Colorado Watershed Assembly	Colorado Watershed Assembly is requesting applications for the Colorado Healthy Rivers Fund (CHRF) Grant Program. This fund grants money to on-the-ground projects that contribute to cleaner water, healthier wildlife habitat, improved recreation and vibrant local economies throughout our state. https://www.coloradowater.org/colorado-healthy-rivers-fund-1
Colorado Watershed Restoration Project	CWCB	The Program provides grants for watershed/stream restoration, flood mitigation, and stream management projects throughout our State. https://cwcb.colorado.gov/colorado-watershed-restoration-grants
CWCB Construction Fund & Severance Tax Trust Fund	CWCB	Trust fund focused on construction and severance taxes. https://www.colorado.gov/pacific/sites/default/files/13WaterResourcesColoradoWate%20ConservationBoardWaterProjectFinancing.pdf
CWCB Drought Mitigation Planning Grant Program	CWCB	Awarded through the Water Efficiency Grant Fund Program, Drought Management Planning Grants are provided to assist water providers or state and local governmental entities in developing drought management and response plans. https://cwcb.colorado.gov/drought-management-planning-grants
CWCB Water Efficiency Grant Program	CWCB	Provides financial assistance to communities, water providers and eligible agencies for water conservation-related activities and projects. Eligible entities as well as state and local governments and agencies can receive funding to develop water conservation and drought plans, implement water conservation goals outlined in a water conservation plan and educate the public about water conservation. https://cwcb.colorado.gov/loans-grants/water-efficiency-grants
CWCB Water Project Loan Program	CWCB	Provides low-interest loans for the design and construction of agricultural, municipal and hydro projects in Colorado. A minimum loan request of $100,000 is recommended. https://cwcb.colorado.gov/loans-grants/water-project-loan-program
CWCB Water Supply Reserve Program	CWCB	The WSRF Program provides grants and loans to assist Colorado water users in addressing their critical water supply issues and interests. The funds help eligible entities complete water activities, which may include competitive grants for Structural and nonstructural water projects or activities. https://cwcb.colorado.gov/loans-grants/water-supply-reserve-fund-grants#:~:text=The%20WSRF%20Program%20provides%20grants,may%20include%20competitive%20grants%20for%3A&text=Structural%20and%20nonstructural%20water%20projects%20or%20activities.

Funding Source	Fund Administrator	Description
Fish and Wildlife Resources Fund	CWCB	Grant money to existing water supply facilities to help preserve a balance between development of the state's resources and the protection of the state's fish and wildlife resources. The grant money is awarded for mitigation of existing water diversion, delivery or storage facilities. https://cwcb.colorado.gov/fish-and-wildlife-resources-fund-grants
Non-Point Source Pollution Grants	Colorado Division of Public Health and the Environment (CDPHE)	The nonpoint source program funds projects that help restore and protect waterbodies from nonpoint source pollution impacts. https://cdphe.colorado.gov/nonpoint-source-funding-opportunities
Severance Tax Multi-Objective Watershed Protection	CWCB	The Severance Tax Operational Grant Program exists primarily to provide grants for regional water resource planning studies and associated demonstration projects. The programs supported by the Fund must promote the mission of the Colorado Water Conservation Board. https://cwcb.colorado.gov/loans-grants/severance-tax-operational-fund-grants
Watershed Restoration Grants	CWCB	The Program provides grants for watershed/stream restoration, flood mitigation, and stream management projects throughout our State. https://cwcb.colorado.gov/colorado-watershed-restoration-grants
Wildfire Risk Reduction Grant Program	Colorado State University	The Colorado Forest Restoration Institute (CFRI) housed at Colorado State University designed and implemented a monitoring process to measure changes in fire potential and fuel hazard reduction accomplished with WRRG funds. Comprehensive on the ground fuels measurements are being collected before and after fire mitigation activities at a subset of WRRG projects to learn from the range of forest conditions, geographies, and vegetation management techniques being implemented around the state. https://cfri.colostate.edu/projects/wildfire-risk-reduction-grant-program/
Agriculture Emergency Drought Response Fund	CWCB	The Program provides up to $1 million annually, in the form of loans or grants, for emergency drought-related water augmentation purposes to Colorado's agricultural water users. https://cwcb.colorado.gov/loans-grants/agricultural-emergency-drought-response-program
Drinking Water Revolving Fund	DOLA	A program to assist public water systems with low interest financing to achieve or maintain compliance with the requirements of the Safe Drinking Water Act and to protect public health. https://www.colorado.gov/pacific/sites/default/files/13WaterResources0927Drinkingwaterrevolvingloanprogram.pdf
Water Pollution Control Revolving Fund	DOLA	DOLA assists publicly owned treatment works with low interest financing to achieve or maintain compliance with requirements of the Act and to protect public health and the environment. https://www.colorado.gov/pacific/sites/default/files/13WaterResources0927WaterPollutionControlRevolvingLoanProgram.pdf
Revolving Loan Fund	DOLA	DOLA currently funds local agencies around the state to operate RLFs for Single Family Owner Occupied Rehabilitation (Rehab), Down Payment Assistance (DPA), and similar homeownership assistance programs. https://cdola.colorado.gov/types-programs-we-fund
Energy/Mineral Impact Assistance Fund (EIAF) Grants	DOLA	The purpose of the EIAF Program is to assist political subdivisions that are socially and/or economically impacted by the development, processing, or energy conversion of minerals and mineral fuels. Funds come from the state severance tax on energy and mineral production and from a portion of the state's share of royalties paid to the federal government for mining and drilling of minerals and mineral fuels on federally-owned land. https://cdola.colorado.gov/funding-programs/energy/mineral-impact-assistance-fund-grant-eiaf

Funding Source	Fund Administrator	Description
State Fire Assistance WUI Grants	Colorado State Forest Service	Grant program that encourages mitigation practices. Eligible applicants include local community groups, local government entities (such as fire protection districts, public and private utilities), state agencies and non-profit groups. https://csfs.colostate.edu/funding-assistance/
Wildfire Mitigation Financial Incentive for private property owners		No online record of this grant program exists.
Tax Break for property owners who perform wildfire mitigation	Colorado Department of Revenue	Individuals, estates and trusts may claim a subtraction on their Colorado income tax return for certain costs incurred in performing wildfire mitigation measures on their property in a wildland-urban interface area within Colorado. The total subtraction a taxpayer can claim per tax year is limited to $2,500. https://www.colorado.gov/pacific/sites/default/files/Income65.pdf
Forest Restoration and Wildfire Risk Mitigation Grant	Colorado State Forest Service (CSFS)	Assists with funding community-level actions across the state that are implemented to protect populations and property in the wildland-urban interface and to promote forest health and the utilization of woody material. Includes funding for capacity building. https://csfs.colostate.edu/funding-assistance/
Rockfall Mitigation Program	Colorado Department of Transportation (CDOT)	Provides internal mitigation design and review for projects funded by rockfall mitigation budget; provides personnel designated as first responders during rockfall related emergencies; installs control devices on rock walls for prevention; posts falling rock signs on highways. https://www.codot.gov/projects/i70mtn/rockfall-mitigation
Colorado Wildfire Preparedness Plan and Fund	Division of Fire Prevention & Control (DFPC)	DFPC may use the moneys in the Wildfire Preparedness Fund to implement the Wildfire Preparedness Plan. https://www.colorado.gov/pacific/dfpc/news/2018-wildfire-preparedness-plan
State Disaster Emergency Fund	(DHSEM)	An all-encompassing post-disaster fund which is triggered by governor executive order; funds typically include response and suppression activities and may include recovery costs as eligible expenditures. https://www.colorado.gov/pacific/dhsem/grant-programs
Water Revenue Bonds Program	Colorado Water Resources & Power Development Authority	Funds water and wastewater treatment plants, pump stations, dams/reservoirs, water rights, pipelines, hydro-electric projects, wells, meters, reuse, storage tanks, etc. https://www.cwrpda.com/water-revenue-bond-program
Conservation Reserve Program	US Department of Agriculture Farm Service Agency and Natural Resource Conservation Service	Retires eligible cropland from agricultural production and plants the land with permanent grass cover to reduce wind erosion and dust hazards. https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/
OTHER		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs. https://www.planning.org/communityassistance/teams/

Table 5-2: Mitigation Actions

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
EPC Actions Countywide									
Initiative #1—Improve Multi-Jurisdictional Hazard Mitigation Plan	Continue to improve the El Paso County Multi-Jurisdictional Hazard Mitigation Plan through annual reviews and incorporation of incident lessons learned	All	In Progress	El Paso County, in conjunction with the incorporated jurisdictions, is currently updating the regional Hazard Mitigation Plan.	High	Low	PPROEM - Public Services Dept.	Ongoing	Goals 1, 2, 3, 4, & 5 Objectives 1.2, 1.3, 1.4, 2.1, 2.2, 3.3, 4.1, 4.2, 5.1, 5.3
Initiative #2— Review and Update EOP	Conduct annual review and tri-annual update of the El Paso County Emergency Operations Plan	All	In Progress	A merged (El Paso County and City of Colorado Springs) EOP is expected to be finalized January 2021.	High	Low	PPROEM - Public Services Dept.	Ongoing	Goals 1, 2, 3, 4, & 5 Objectives 1.2,1.3,1.4,2.1, 2.2,3.3,4.2,5.1
Initiative #3— Partner with Local Businesses, CoC, NGOs to provide critical services (formerly #4)	Partner with local businesses, Chamber of Commerce, and NGOs that provide critical services to citizens to ensure continuity of services and a coordinated response	All	Ongoing	The Emergency Management Collaborative is a collaboration of diverse organizations and agencies in El Paso County. The group meets quarterly and focuses on plans for the wellbeing of the community.	Low	Med	PPROEM - Public Services Dept, Municipalities and County Agencies	Ongoing	Goals 2, 4, & 6 Objectives 2.2, 2.3, 4.1, 4.2, & 6.3
Initiative #4— Enhance Awareness and Preparedness of Residents (formerly #5)	Enhance awareness and preparedness of residents through quarterly Citizen Emergency Response Training and facilitate community training requests for emergency preparedness education	All	Ongoing	El Paso County CERT continues to conduct regular trainings and exercises to meet the needs of the community.	High	Low	PPROEM - Public Services Dept	Short-term	Goal 3 Objectives 3.1, 3.2, & 3.3
Initiative #5— Enhance Emergency Preparedness Information and Community Outreach (formerly #6)	Continue to enhance emergency preparedness information available to citizens and visitors through the county website and community outreach opportunities	All	Ongoing	EPC maintains a website that includes preparedness information on numerous hazards. Social media efforts electronic newsletters, public presentations, and participation in community events are used to distribute information and promote preparedness throughout the year.	High	Med	PPROEM - Public Services Dept, El Paso County IT/ Public Information Officer	Short term	Goal 3 Objectives 3.1, 3.2, & 3.3
Initiative #6— Develop Emergency Preparedness Public Service Announcements and Educational Content (formerly #7)	Work with the county PIO and Information Technology to develop emergency preparedness public service announcements and educational content to be televised on the El Paso County broadcast station	All	Ongoing	OEM will work with the EPC and COS Communications offices planning to pre-produce video messaging for evacuations, blizzards, and other predictable circumstances. OEM is currently working with County and	Low	High	PPROEM - Public Services Dept IT/Public Information Officer	Ongoing	Goal 3 Objectives 3.1, 3.2, & 3.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
				COS PIOs to pre-script messaging for social media and news releases when educational content is needed.					
Initiative #7— Multi-faceted Public Awareness Campaign to Increase Enrollment in Emergency Notification System (formerly #8)	Develop a multi-faceted public awareness campaign to increase citizen enrollment in the El Paso County Emergency Notification System.	All	Ongoing	This is part of El Paso Teller 911. This messaging is incorporated into all public presentations, events, trainings, and publications.	High	Med	PPROEM - Public Services Dept, EPC Public Information Office, El Paso/Teller 911	Ongoing	Goals 1, 2, & 3 Objectives 1.1, 2.2, & 3.1
Initiative #8— Encourage Communities to Adopt Fire Adaptive Community Standards (formerly #10)	Work with individual communities within the county, such as HOAs and municipalities, to adopt Fire Adaptive Community standards and practices.	Lightning, Wildfire	Ongoing	Since 2017, there have been 4 Fire Adaptive Community workshops. CERT Volunteers have been trained to provide outreach and assistance to communities for Wildfire risk assessments.	Med	Med	PPROEM - Public Services Dept, HOAs/ Municipalities	Long-term	Goals 2, 3, & 4 Objectives 2.1, 2.2, 3.1, 3.3, & 4.2
Initiative #9— Identify Areas for Cisterns or Hydrants (formerly #11)	Conduct an analysis identifying areas in the county that may benefit from the installation of cisterns or hydrants to provide water delivery during firefighting operations in concurrence with the El Paso County Land Development Code.	Drought, Wildfire	Ongoing	In light of recent fires of 2018, identify alternate resources for water in rural areas will become a priority.	Low	High	Fire Protection Districts	Long-term	Goals 1, 2, & 5 Objectives 1.3, 2.1, 2.2, 5.1 & 5.4
Initiative #10— Mitigation Efforts on Publicly Owned Properties Based on Fire Adaptive Community Standards (formerly #12)	Perform mitigation efforts within publicly owned properties based on Fire Adaptive Community standards.	Lightning, Mud or Debris Flow, Wildfire	Ongoing	The El Paso County Sherriff's Office Wildland Team performs mitigation projects based on required standards on a regular basis.	High	Med	PPROEM - Public Services Dept, EPC Sheriff Office-Emergency Service Division/Wildland	Ongoing	Goals 2 & 4 Objectives 2.1, 2.2, 4.1, 4.2, & 4.3
Initiative #11— Conduct Hazardous Materials Flow Study (formerly #13)	Conduct a hazardous materials flow study for high volume road and rail ways within the county.	Hazmat	New/ Modified from previous plan	New flow studies to be initiated in 2021.	Med	Med	PPROEM - Public Services Dept, EPC GIS	Short-term	Goals 1, 2, & 5 Objectives 1.4, 2.1, 2.2, & 5.1
Initiative #12— Increase Number of Personnel Trained as HAZMAT Technicians and	Increase the number of personnel trained as HAZMAT technicians and specialists to elevate regional response capability.	Hazmat	Ongoing	The El Paso County HazMat Team is made up of mostly volunteers. Recruiting new members is a continuous process. The HazMat Team conducts monthly trainings in	Med	Med	PPROEM - Public Services Dept/ HAZMAT	Short-term	Goals 1, 2, & 4 Objectives 1.2, 2.1, 4.2, & 4.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Specialists (formerly #14)				addition to the many events they respond to.					
Initiative #13— Expand Local Emergency Planning Committee (LEPC) (formerly #16)	Expand the community cross-section and membership of the LEPC and research methods to increase its role within the county emergency management program.	All Hazards	Ongoing	LEPC meetings are held quarterly. An agenda is created and posted prior to the meeting. Sign in sheets and minutes are obtained. The minutes are posted and distributed as required.	Med	Low	PPROEM - Public Services Dept, LEPC Chairman	Short-term	Goals 1, 4, 5, & 6 Objectives 1.4, 4.1, 4.2, 4.3, 5.3, & 6.3
Initiative #14— Enhance Communication Network Related to Delay or Closure of County Facilities and Roadways (formerly #17)	Continue to enhance the communication network related to the delay or closure of county facilities and roadways.	Flood, Mud or Debris Flow, Wildfire, Winter Storm	Ongoing	The El Paso County Public Information Office along with the Crisis Communication Network works closely with local media to distribute information regarding facility and road closures affecting the public, as information on emergency notifications is created.	High	Med	PPROEM - Public Services Dept, EPC Public Information Officer	Short-term	Goals 1, 3, & 4 Objectives 1.1, 1.4, 3.1, 3.2, 3.3, & 4.2
Initiative #15— Reduce Roadway Hazards (formerly #19)	Reduce roadway hazards to maintain safe ingress/egress for El Paso County residents and first responders.	Flood, Landslide/ Rockfall, Mud or Debris Flow, Wildfire, Winter Storm	Ongoing	Regular maintenance of roadways for ingress and egress remains a priority for the El Paso County Department of Public Works through daily operations.	Med	High	PPROEM - Public Services Dept - EPC DOT	Short- to long-term	Goals 1, 2, & 4 Objectives 1.3, 2.1, 2.2, 4.1, & 4.2
Initiative #16— Develop Strategic Flood Warning Plan (formerly #20)	Develop an integrated strategic flood warning plan that addresses the repair, repositioning, or upgrade of existing flood warning systems.	Flood, Mud or Debris Flow	Ongoing	Everbridge, Reverse 911, and sirens are used as warning systems. PPROEM offers several sky warn and weather spotter classes throughout the year for the community.	Med	High	PPROEM - Public Services Dept, Local Jurisdictions	Short- to long-term	Goals 1, 2, 3, & 4 Objectives 1.1, 1.4, 2.1, 3.1, 3.3, & 4.3
Initiative #17— Maintain Catch Basins and Debris Fences in Critical Areas (formerly #23)	Continue to maintain catch basins and debris fences in critical areas to reduce the threat to population centers.	Flood, Mud or Debris Flow	Ongoing	Catch basins have been installed at the Cascade Channel and debris nets installed in Manitou Springs at Queens Canyon. The Rainbow Falls catch basins are maintained and cleaned out. El Paso County is in the process of decommissioning the catch basins but will leave in place in case of future flooding.	High	High	EPC OEM - Public Services Dept	Ongoing	Goals 1, 2, 4, 5, & 6 Objectives 1.3, 2.1, 2.2, 4.2, 5.2, 5.3, & 6.1

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #18— Increase Use of Weather Radio Announcements (formerly #27)	Increase use of weather radio announcements to enhance the redundancy of public information delivery in severe weather situations throughout the county.	Severe Weather, Flood	Ongoing	PPROEM and Public Information Office work closely with the National Weather Service for the delivery of severe weather situation announcements.	Med	Low	NWS, PPROEM -Public Services Dept, Local Jurisdictions	Short-term	Goals 1, 3, & 4 Objectives 1.1, 3.1, 3.2, 3.3, 4.1, & 4.2
Initiative #19— Increase Municipalities That Meet Criteria of Storm Ready or Weather Ambassador Programs (formerly #28)	Increase the number of municipalities within the county that meet the Storm Ready and/or Weather Ambassador program criteria.	Severe Weather, Flood	Ongoing	Fountain purchased new weather radios and are placed in various locations at City Hall. Manitou Springs has a siren installed and uses Everbridge as a backup system. EPC can use Everbridge and local media as a warning system. Weather spotter classes are held annually for the public. EPC is working with NWS for "weather ready" designation for the county.	Low	Low	National Weather Service, Local Jurisdictions	Short-term	Goals 1, 3, & 4 Objectives 1.1, 1.3, 3.1, 3.2, 3.3, 4.1, & 4.2
Initiative #20— Ensure Runway Safety Zones are Considered During Community Planning (formerly #29)	Continue to ensure runway safety zones are considered during community planning for new construction/ development applications.	Aircraft Accident, Hazmat	Ongoing	Safety zones are considered for new construction along runways by the airport. Pikes Peak Regional Building Department has codes in place to ensure these are met.	Low	Low	Pikes Peak Regional Building Dept/ Colorado Springs Airport	Ongoing	Goals 1, 2, 3, 4, & 5 Objectives 1.4, 2.2, 2.3, 3.2, 4.1, 4.2, & 5.1
Initiative #21— Establish Severe Weather Protective Areas (formerly #30)	Establish severe weather protective areas within county parks and open space.	Severe Weather	Ongoing	Protective shelters are in most of the parks and open spaces in El Paso County. Safety is a priority and early warning is the primary goal. Planned County Fairgrounds project includes two underground shelters for hazardous weather events.	Low	Med	EPC Parks Dept/ Public Works, PPROEM - Public Services Dept	Short- to long-term	Goals 1, 4, & 5 Objectives 1.3, 4.1, 4.2, & 5.3
Initiative #22 - Construct a Community Shelter on County Fairgrounds Property	Explore the development and construction of 1-2 community shelters for inclement weather that will hold 100-200 private citizens per structure during hazardous weather events.	Severe Weather	New	Identified for 2020 plan update.	Med	High	El Paso County Community Services Dept	Short-term	Goals 1 Objectives 1.3
Initiative #23 - Multi-jurisdictional Cyber Incident Response	El Paso County, in conjunction with the City of Colorado Springs, continue inter-municipality discussions on cyber threats – to include incidents, assessed risks, and counter-measure best-practices – up to and possibly including the formation of a regional Security Incident Response Team.	Cyber-attack	New	Identified for 2020 plan update.	Low	Med	El Paso County and City of Colorado Springs IT Departments	Short- to long-term	Goals 2, 4 Objectives 2.1, 2.2, 4.1, 4.2, & 4.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #24 – Continue to coordinate with El Paso County Planning	PPROEM has started to work with El Paso County Planning during the current Master Plan Update. Continue this coordinate through to realize mitigation benefits from subsequent policy, land use and zoning revisions.	Flood Wildfire Drought Landslide	New	Identified for 2020 Plan update.	High	Low	El Paso County OEM and El Paso County Planning and Development.	Short- to long-term	Goal 1, 2, 4 & 5 Objectives: 1.3, 2.1, 2.2, 2.4, 2.5, 4.1, 4.2, 4.3, 5.1, 5.2 & 5.4
Initiative #25 – Support CRS in El Paso County and Incorporated Jurisdictions	Seek opportunities to continue to improve CRS score through trainings, identifying eligible activities and documents and pursuing new activities aligned with the program.	Flood	New	Identified for 2020 Plan update.	High	Med	El Paso County OEM	Short-to-long-term	Goal 2, 3, 4 & 5 Objectives: 2.1, 2.2, 2.4, 2.5, 3.14.1, 4.2, & 5.1
CALHAN INITIATIVES									
Initiative #26— Community Outreach	Review actions that may be taken in case of weather-related emergencies to include notes on utility bills, fliers throughout town and public meetings that will be scheduled later in the year. Weather related hazards are the most prevalent in our areas.	Severe Weather	New/ Modified from prior plan	Identified for 2020 plan update.	Med	Low	Town of Ramah/ Calhan	Short-term	Goals: 1, 3, 4 Objectives: 1.1, 1.4, 3.1, 3.2, 3.3, 4.2
Initiative #27— Wastewater/ Stormwater System Improvements	Water and sewer system improvements to alleviate security issues and lessen the likelihood of accidents. Re-enforce the sewer lagoons fencing and install new locks. Water tanks and pump houses will be re-done for the chlorine systems and increased security.	Acts of Violence	New	Identified for 2020 plan update.	Med	High	Town of Ramah/ Calhan	Long-term	Goals: 2, 5, 6 Objectives: 2.1, 2.5, 5.4, 6.1
Initiative #28— Storm drain improvements	Street infrastructure to be improved regarding drainage. This will help with flooding issues. Grants will be sought to add drainage plans to all main roads.	Flood	New	Identified for 2020 plan update.	Med	High	Town of Ramah/ Calhan and El Paso County	Long-term	Goals: 2 Objectives: 2.1, 2.2, 2.5
Initiative #29— Hazard Weather Shelter Designation	Designate areas that can be used for shelters for tornadoes. The Town of Calhan has a list, but it needs to be updated.	Tornado	New	Identified for 2020 plan update.	Low	Low	Town of Ramah/ Calhan	Short-term	Goals: 1 Objectives: 1.2, 1.3, 1.4
Initiative #30— Calhan: EOP Update	Update the Local Emergency Operations Plan in conjunction with the Fire Department. Contact the Fire Chief and set up meeting with the board of Trustees and the Fire Chief before the end of 2020.	All	New	Identified for 2020 plan update.	High	Low	Town of Ramah/ Calhan	Short-term	Goals 1, 2, 3, 4, & 5 Objectives 1.2,1.3,1.4,2.1, 2.2,3.3,4.2,5.1

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #31 - Calhan: Historic and Cultural Development	Create an assessment of historic and cultural landmarks; form a historic preservation commission to preserve and protect Calhan's heritage and protect community assets from hazards.	All	New	Identified for 2020 plan update.	Low	Med	Town of Ramah/ Calhan	Long-term	Goal 2 Objectives: 2.1, 2.2, 2.5
Initiative #32 - Parks and Recreation Improvements	Maintain and protect the towns special and natural features, open space, and watershed areas; collaborate with El Paso County and surrounding towns to protect the areas major attractions: Paint Mines, Big Sandy Creek, and Ramah Reservoir. Encourage new development to protect terrain and preserve significant vegetation, scenic views, and incorporate natural trees and shrubs into landscape plans. Update town codes and ordinances to protect sensitive natural areas and open spaces.	Flood, wildfire	New	Identified for 2020 plan update.	High	Med	Town of Ramah/ Calhan and El Paso County	Long-term	Goals: 1, 5 Objectives: 1.3, 5.2, 5.4
Initiative #33 - Land Use and Growth Management	Provide for the orderly growth of the town to be consistent with the community vision; Implement floodplain management; Increase coordination with El Paso County regarding growth and development using IGAs.	Flood, wildfire	New	Identified for 2020 plan update.	Med	Med	Town of Ramah/ Calhan	Long-term	Goals: 2, 4, 5 Objectives:2.2, 4,2, 4.3 5.1, 5.2, 5.4
Initiative #34 - Community Infrastructure and Public Facilities	Ensure that future growth and development does not exceed the capabilities of public services and facilities; Develop an urban growth area map; Inventory utility boundaries and locations; Implement traffic control and planning techniques that protect the small town character; Improve safety for pedestrians along U.S. Highway 24; Improve the overall appearance and condition of the existing infrastructure; Improve surface conditions and drainage of all roads.	All	New	Identified for 2020 plan update.	High	High	Town of Ramah/ Calhan and El Paso County	Long-term	Goals: 2, 5 Objectives: 2.1, 2.2, 2.5, 5.1, 5.2
Initiative #35— Vulnerable Population List	Get list of vulnerable population so some type of phone tree can be set up to check on individuals in the event of an emergency. There are quite a few elderly citizens that may live alone in both Calhan and Ramah.	All	New/ Modified from Prior Plan	Identified for 2020 plan update.	High	Low	Town of Ramah/ Calhan	Short-term	Goals: 1, 3, 4 Objectives: 1.1, 1.4, 3.1, 3.2, 3.3, 4.2
Initiative #36— Plant Vegetation Along	Develop a drainage or erosion control plan to incorporate plants and natural resources to mitigate erosion along roadways.	Flood	Unknown	unknown	Low	Med	Town of Ramah/Calhan	Short- to long-term	Goals 2, 3, & 5 Objectives 2.1,

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Roadways to Mitigate Erosion (formerly #35)									2.2, 3.2, 3.3, & 5.2
Initiative #37— Develop Decision Tree Outlining Roles and Responsibilities During Emergencies (formerly #36)	Develop a decision tree fully outlining the roles and responsibilities of local, regional, and state response teams, including HAZMAT teams and other specialized response teams. Coordinate with the county to develop a plan and point person to contact immediately.	Dam failure, earthquake, flood, pandemic, tornado, wildfire, acts of violence, hazmat	unknown	unknown	Med	low	Town of Ramah/Calhan and El Paso County	Short-term	Goals 1, 2, & 4 Objectives 1.2, 2.4, 4.1, 4.2, & 4.3
Initiative #38— Obtain GIS Data (formerly #37)	Work with county, regional, and state organizations to obtain GIS data for the town. Use existing GIS data to identify areas at risk for natural or man-made hazards, to aid responders during emergencies (locations of critical facilities, infrastructure, alternative access routes, etc), and to incorporate the areas at risk for hazards into local planning and land use document.	Dam failure, flood, wildfire	unknown	unknown	Low	Med	Town of Ramah/Calhan	Short-term	Goals 1 & 5 Objectives 1.2, 1.4, 5.1, & 5.2
Initiative #39— Identify Temporary Source of Water (formerly #38)	Identify a temporary supply of water in case of contamination or any other hazard that would affect the treatment or transportation of water to the towns. Coordinate with local, county, or regional governments (IGA or MOA) to supply water temporarily during or immediately following a hazard event	Drought & extreme heat, flood, wildfire, acts of violence	unknown	unknown	High	low	Town of Ramah/Calhan	Short-term	Goals 2, 4, 5, & 6 Objectives 2.1, 4.1, 4.2, 4.3, 5.2, 6.1, 6.2, & 6.3
RAMAH INITIATIVES									
Initiative #40— Community Outreach	Review actions that may be taken in case of weather-related emergencies to include notes on utility bills, fliers throughout town and public meetings that will be scheduled later in the year. Weather related hazards are the most prevalent in our areas.	Severe Weather	New/ modified from prior plan	Identified for 2020 plan update.	Med	Low	Town of Ramah/ Calhan	Short-term	Goals: 1, 3, 4 Objectives: 1.1, 1.4, 3.1, 3.2, 3.3, 4.2
Initiative #41— Wastewater/ Stormwater System Improvements	Water and sewer system improvements to alleviate security issues and lessen the likelihood of accidents. Re-enforce the sewer lagoons fencing and install new locks. Water	Acts of Violence	New	Identified for 2020 plan update.	Med	High	Town of Ramah/ Calhan	Long-term	Goals: 2, 5, 6 Objectives: 2.1, 2.5, 5.4, 6.1

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
	tanks and pump houses will be re-done for the chlorine systems and increased security.								
Initiative #42— Storm drain improvements	Street infrastructure to be improved regarding drainage. This will help with flooding issues. Grants will be sought to add drainage plans to all main roads.	Flood	New	Identified for 2020 plan update.	Med	High	Town of Ramah/ Calhan and El Paso County	Long-term	Goals: 2 Objectives: 2.1, 2.2, 2.5
Initiative #43— Hazard Weather Shelter Designation	Designate areas that can be used for shelters for tornadoes. The Town of Calhan has a list, but it needs to be updated.	Tornado	New	Identified for 2020 plan update.	Low	Low	Town of Ramah/ Calhan	Short-term	Goals: 1 Objectives: 1.2, 1.3, 1.4
Initiative #44 - Parks and Recreation Improvements	Maintain and protect the towns special and natural features, open space, and watershed areas; collaborate with El Paso County and surrounding towns to protect the areas major attractions: Paint Mines, Big Sandy Creek, and Ramah Reservoir. Encourage new development to protect terrain and preserve significant vegetation, scenic views, and incorporate natural trees and shrubs into landscape plans. Update town codes and ordinances to protect sensitive natural areas and open spaces.	Flood, wildfire	New	Identified for 2020 plan update.	Med	Med	Town of Ramah/ Calhan and El Paso County	Long-term	Goals: 1, 5 Objectives: 1.3, 5.2, 5.4
Initiative #45 - Land Use and Growth Management	Provide for the orderly growth of the town to be consistent with the community vision; Implement floodplain management; Increase coordination with El Paso County regarding growth and development using IGAs.	Flood, wildfire	New	Identified for 2020 plan update.	Med	Med	Town of Ramah/ Calhan	Long-term	Goals: 2, 4, 5 Objectives:2.2, 4,2, 4.3 5.1, 5.2, 5.4
Initiative #46 - Community Infrastructure and Public Facilities	Ensure that future growth and development does not exceed the capabilities of public services and facilities; Develop an urban growth area map; Inventory utility boundaries and locations; Implement traffic control and planning techniques that protect the small town character; Improve safety for pedestrians along U.S. Highway 24; Improve the overall appearance and condition of the existing infrastructure; Improve surface conditions and drainage of all roads.	All	New	Identified for 2020 plan update.	High	High	Town of Ramah/ Calhan and El Paso County	Long-term	Goals: 2, 5 Objectives: 2.1, 2.2, 2.5, 5.1, 5.2
Initiative #47— Vulnerable Population List	Get list of vulnerable population so some type of phone tree can be set up to check on individuals in the event of an emergency.	All	New/ modified from prior plan	Identified for 2020 plan update.	High	Low	Town of Ramah/ Calhan	Short-term	Goals: 1, 3, 4 Objectives: 1.1, 1.4, 3.1, 3.2, 3.3, 4.2

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
	There are quite a few elderly citizens that may live alone in both Calhan and Ramah.								
Initiative #48— Plant Vegetation Along Roadways to Mitigate Erosion (formerly #35)	Develop a drainage or erosion control plan to incorporate plants and natural resources to mitigate erosion along roadways.	Flood	unknown	unknown	Low	Med	Town of Ramah/Calhan	Short- to long-term	Goals 2, 3, & 5 Objectives 2.1, 2.2, 3.2, 3.3, & 5.2
Initiative #49— Develop Decision Tree Outlining Roles and Responsibilities During Emergencies (formerly #36)	Develop a decision tree fully outlining the roles and responsibilities of local, regional, and state response teams, including HAZMAT teams and other specialized response teams. Coordinate with the county to develop a plan and point person to contact immediately.	Dam failure, earthquake, flood, pandemic, tornado, wildfire, acts of violence, hazmat	unknown	unknown	Med	Low	Town of Ramah/Calhan and El Paso County	Short-term	Goals 1, 2, & 4 Objectives 1.2, 2.4, 4.1, 4.2, & 4.3
Initiative #50— Obtain GIS Data (formerly #37)	Work with county, regional, and state organizations to obtain GIS data for the town. Use existing GIS data to identify areas at risk for natural or man-made hazards, to aid responders during emergencies (locations of critical facilities, infrastructure, alternative access routes, etc), and to incorporate the areas at risk for hazards into local planning and land use document.	Dam failure, flood, wildfire	unknown	unknown	Low	Med	Town of Ramah/Calhan	Short-term	Goals 1 & 5 Objectives 1.2, 1.4, 5.1, & 5.2
Initiative #51— Identify Temporary Source of Water (formerly #38)	Identify a temporary supply of water in case of contamination or any other hazard that would affect the treatment or transportation of water to the towns. Coordinate with local, county, or regional governments (IGA or MOA) to supply water temporarily during or immediately following a hazard event	Drought, flood, wildfire, acts of violence	unknown	unknown	High	Low	Town of Ramah/Calhan	Short-term	Goals 2, 4, 5, & 6 Objectives 2.1, 4.1, 4.2, 4.3, 5.2, 6.1, 6.2, & 6.3
FOUNTAIN INITIATIVES									
Initiative #52— Put Flood Information in the Local Paper: Seasonal (formerly #41)	Put flood information in the local paper to educate the community about flood risk and emergency actions.	Dam failure, flood	Ongoing	During flood season this is completed or when changes are made from hazard reports	Med	Low	City of Fountain OEM	Short-term	Goals 1 & 3 Objectives 1.2, 3.1, 3.2, & 3.3
Initiative #53— Map and Assess Community	Map and assess community vulnerability to seismic hazards and implement the maps	Earthquake	In progress	City GIS working with city agencies; some have copies of GIS products	High	Low	City of Fountain OEM	Short- to long-term	Goals 1 & 5 Objectives 1.3, 1.4, & 5.1

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Vulnerability to Seismic Hazards (formerly #42)	and assessments into local planning regulations and plans.								
Initiative #54— Conduct Lightning Awareness (formerly #44)	Educate the community about Lightning Awareness	Lightning	Ongoing	Annual training for all city employees established and is required	Med	Low	City of Fountain OEM	Short-term	Goal 3 Objectives 3.1, 3.2, & 3.3
Initiative #55— Tornado Plans and Drills for Public Buildings (formerly #47)	Develop tornado plans and implement drills for public buildings to protect citizens	Tornado	Ongoing	Tornado and Fire drills held annually for all public buildings; part CIRSA	Low	Low	City of Fountain OEM	Short-term	Goals 1, 2, & 3 Objectives 1.2, 1.3, 2.1, & 3.1
Initiative #56— Develop Community Wildland Fire Protection Plan (formerly #48)	Develop protection plans for Wildland Fire in the Interface Zone to identify specific areas and mitigation technologies by areas that have a potential to be affected by wildland fires	Wildfire	In Progress	Plan being worked on by City Fire	High	Low	City of Fountain OEM	Short- to long-term	Goals 1, 3, 4, & 5 Objectives 1.2, 1.3, 1.4, 3.1, 4.2, & 5.1
Initiative #57— Develop Wildland Fire Interface Code (formerly #49)	Develop a Wildland Fire Interface Code to ensure defensible space from open space and wildland areas from built up areas to protect structures	Wildfire	In Progress	City Fire Department is developing the code	High	Low	City of Fountain Fire Prevention Division	Short- to long-term	Goals 1, 3, 4, & 5 Objectives 1.2, 1.3, 1.4, 3.1, 4.2, & 5.1
Initiative #58— Participate in Local Emergency Planning Committee (formerly #50)	Include the city in the LEPC and increased awareness and response planning	Hazmat	Ongoing	Regional Hazard Mitigation Plan Stakeholder Meeting (Feb 2020), Recovery/Damage Assessment/Debris Management Plans: participated in stakeholder meetings with regional partners from Jan-Feb 2020)	Low	Low	City of Fountain Office of Fire Department	Short- to long-term	Goals 1, 4, 5, & 6 Objectives 1.4, 4.1, 4.2, 4.3, 5.3, & 6.3
Initiative #59— Meet Criteria for Storm Ready Community (formerly #52)	Meet the criteria for a Storm Ready Community to prepare the community to be storm ready and resistant.	Severe Weather	Ongoing	City engineering considers these requirements prior to project start	Med	Low	City of Fountain OEM	Short- to long-term	Goals 1, 3, & 4 Objectives 1.1, 3.1, 3.2, 4.1, & 4.2
Initiative #60— Develop a Coordinated Response Plan for Acts of Violence (formerly #53)	Develop coordinated rapid response for extreme acts of violence by coordinating with the police department, fire department, school district, city hall and emergency management.	Acts of violence	Ongoing	City leadership exercises annually.	Low	Low	City of Fountain OEM	Short- to long-term	Goals 1, 3, & 4 Objectives 1.1, 3.1, 3.2, 4.1, & 4.2
Initiative #61— Develop Coordinated Rapid Response to Aircraft Incidents (formerly #54)	Develop coordinated rapid response accidents by coordinating with the police department, fire department, airport, CSFD, El Paso County SO and emergency management.	Aircraft accident	In Progress	City Police and Fire developing plans to support coordinated response.	Low	Low	City of Fountain OEM	Short- to long-term	Goals 1, 3, & 4 Objectives 1.1, 3.1, 3.2, 4.1, & 4.2
Initiative #62— Conduct Annual Review and Tri-	Conduct annual review and tri-annual updates to the Fountain EOP.	All	Ongoing	Executed; awaiting inputs from County plan for latest.	Med	Low	City of Fountain OEM	Ongoing	Goals 1, 2, 3, 4, & 5 Objectives

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
annual Update of the Fountain EOP (formerly #55)									1.2, 1.3, 1.4, 2.1, 2.2, 3.3, 4.2, & 5.1
Initiative #63 - Update OEM consequence capabilities management.	Build/update OEM consequence capabilities management. IE: equipment, vehicles, a disaster route map – highlighting the main roads out of the city. Also a public outage system.	All	New/ In Progress	Identified for 2020 plan update. This project is being worked on now and should be completed within one year to two years.	High	Med	City of Fountain OEM	Short-term	Goals 1, 2, 3, 4, & 5 Objectives 1.2, 1.3, 1.4, 2.1, 2.2, 3.3, 4.2, & 5.1
Initiative #64 - Community Wildfire Protection Plan	Fire Department will complete a Community Wildfire Protection Plan within two years.	Wildfire	New	Identified for 2020 plan update.	High	Low	Fire Department	Short-term	Goals: 2 Objectives: 2.1, 2.2
Initiative #65 - Social Media information for the public and employees on COVID-19 Health Management Programs.	Fountain Social Media information for the public as well as employees on COVID-19 Health Management Programs. Locations of free testing sights, tracing, information on keeping safe at Christmas and family gatherings. Free antibody testing for employees. Links to El Paso County Health Department and COVID dial.	Pandemic	New	Identified for 2020 plan update. Ongoing and will be completed in 2 weeks.	High	Med	City of Fountain OEM	Short-term/ Ongoing	Goals: 3 Objectives: 3.1, 3.2, & 3.3
Initiative #66 - Flood awareness/ prevention Program (formerly #39 & 40)	Locate pamphlets at City Hall and information on City website.	Flood	New / Modified from Prior Plan	Identified for 2020 plan update. Completion time six months.	Med	Low	City of Fountain OEM	Short-term	Goals: 3 Objectives: 3.1, 3.2 & 3.3
GREEN MOUNTAIN FALLS INITIATIVES									
Initiative #67— Work with Property Owners to Mitigate Wildfire Risks to Property (formerly #57)	Work with property owners to mitigate risks to property by establishing clean-up/ mitigation days within town, and fuel reduction by thinning brush and removing disease and dead trees.	Wildfire	New/ Ongoing	The Fire Mitigation Committee is working with CUSP, and CSU on Fire Mitigation efforts. The Fire Mitigation Committee and Town Manager have submitted a 5-year "Healthy Forests Plan." Other funding sources for Fire Mitigation are needed, and the Town is searching for them.	High	Med	Fire protection district, CWPP Committee, PPROEM - Public Services Dept.	Ongoing	Goals 2, 4, & 6 Objectives 2.1, 2.2, 2.5, 4.2, & 6.1
Initiative #68— Update Town Website with Emergency Information (formerly #58)	Update town website with emergency information; create "Emergency Information" tab on Town website.	Dam failure, flood, wildfire, winter storm	New/ Ongoing	Information is current on the Town website, and will be re-evaluated during Summer 2020. Town Staff anticipates that new website will go live in August 2020, as Town Staff is presently working on a new updated	Low	Low	Town of Green Mountain Falls	Short-term	Goals 1 & 3 Objectives 1.1, 3.1, 3.2, & 3.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
				and more user-friendly version of the Town's website with our State SIPA partner.					
Initiative #69— Review and Update Current Disaster Plan (formerly #59)	Review and update current emergency disaster plan for town.	All	In progress	The Town completed a new Comprehensive Plan in 2019, which speaks to plans for an Updated Disaster Plan.	High	Low	Town of Green Mountain Falls	Short-term	Goals 1, 2, & 3 Objectives 1.2,1.3,1.4,2.1, & 3.3
Initiative #70— Mitigating Flood Debris on Green Mountain Falls Property (formerly #61)	Pre flood mitigation efforts to remove debris and restore the creeks to prevent flooding concerns, coordinated by town Public Works Department.	Flood, mud or debris flow	Ongoing	Previous debris removal from 2018 rain events is complete.	Med	Med	Town of Green Mountain Falls	Ongoing	Goals 1, 4, & 6 Objectives 2.1, 2.2, 4.2, & 6.1
Initiative #71 - Pandemic Messaging	Public Outreach on pandemic-related messaging via social media	Pandemic	New/ In Progress	Identified for 2020 plan update. 2-year initiative, 1 year into it.	High	Low	Town of Green Mountain Falls	Short-term	Goal 3 Objectives: 3.1, 3.2 & 3.3
MONUMENT INITIATIVES									
Initiative #72— Add a Link to the Town Website "Emergency Preparedness" (formerly #64)	Working with our website representative to re-organize and add "emergency preparedness" to website	All	Ongoing	https://www.townofmonument.org/507/Emergency-Preparedness	Med	Low	Town of Monument	Short-term	Goals 1 & 3 Objectives 1.1, 3.1, 3.2, & 3.3
Initiative #73— MOU with D38 for Use of Their Facilities if needed (formerly #62)	Develop MOU with school district D38 for the use of their facilities to assist in restoring the function of natural systems in the event Town of Monument facilities are compromised	All	In progress	Meeting scheduled for mid-Oct to move forward on an MOU.	High	Low	Town of Monument LPSD	Short-term	Goals 1, 2, 3, 4, 5, & 6 Objectives 1.2, 2.3, 3.3, 4.1, 4.2, 4.3, 5.1, 5.3, 6.1, 6.2, 6.3
Initiative #74— Adopt Water Mitigation Plan, Water Conservation Plan and Reusable/ Renewable Water Plan (formerly #66)	Adopt water mitigation plan, water conservation plan, and reusable/renewable water plan, including ordinances limiting landscape/types of grasses and trees grown; water restrictions; and mitigation program offered by the Town (free disposal of shrubs/brush for mitigating property).	Drought	In progress	This project is partially completed. The Town has successfully completed a Water Conservation Plan and submitted it to Colorado Water Conservation Board. The Town is in the early stages of a plan to utilize return flows from the wastewater treatment plant for drinking water purposes as part of a regional plan amongst the 4 Northern El Paso County Water Entities.	High	Med	Town of Monument	Short-term	Goals 1, 2, 3, 4, & 5 Objectives 1.3, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, & 5.3
Initiative #75— Adopt Emergency Operations	Working off 2012 Plan, with the intent to update.	All	In Progress	This plan is in the final stages of development.	High	Med	Town of Monument	Short-term	Goals 1, 2, 3, 4, & 5 Objectives

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Plan and Pre-Disaster Mitigation Plan (formerly #67)									1.3, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, & 5.3
Initiative #76— Enhance Use of Emergency Notification System within the Town (formerly #68)	Enhance use of emergency notification system with the Town.	All	Ongoing	We utilize reverse 911 and our social media platforms along with the website. Looking into new and additional notification systems.	Low	High	Town of Monument	Long-term	Goals 1, 3, 5, & 6 Objectives 1.1, 1.2, 3.1, 5.1, 6.1, 6.2, 6.3
Initiative #77— Coordinate with County GIS to Develop Layer for High Risk Areas/Hazards (formerly #69)	Coordinate with County GIS to develop layer for high risk areas/hazards to educate citizens.	All	In progress	We are in the early planning stages with our GIS coordinator.	Low	Med	Town of Monument	Long-term	Goals 1, 2, 3, 4, 5, & 6 Objectives 1.4, 2.1, 2.2, 3.1, 3.2, 4.3, 5.1, 5.3, & 6.1
Initiative #78— Emergency preparedness planning and training	Emergency preparedness planning to include EOC training, the standup of a disaster committee, and evacuation planning/execution	All	New	Identified for 2020 plan update. Two years, ongoing, 6 months into it	Med	Med	Town of Monument	Ongoing	Goals 1, 3 Objectives: 1.1, 1.2, 1.3 & 3.1
Initiative #79— Public Messaging on COVID-19	Public Messaging on CV19 response, recovery, and policies; utilizing social media to push notifications, best practices, etc.	Pandemic	New	Identified for 2020 plan update.	High	Low	Town of Monument	Short-term	Goals 3 Objectives 3.1, 3.2 & 3.3
PALMER LAKE INITIATIVES									
Initiative #80— Adopt Emergency Operations Plan and Pre-Disaster Mitigation Plan (formerly #71)	Adopt Emergency Operations Plan, Pre-Disaster Mitigation Plan, water mitigation plan, water conservation plan and reusable/renewable water plan, including ordinances limiting landscape/types of grasses and trees grown; water restrictions; mitigation program offered by the Town (free disposal of shrubs/brush for mitigating property).	All	Ongoing	Unknown	High	Med	Town of Palmer Lake	Short-term	Goals 1, 2, 3, 4, &5 Objectives 1.3, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, & 5.3
Initiative #81— Install Lightning/ Ground Protection on Critical Infrastructure (formerly #72)	Ensure continued operations of critical infrastructure in the event of lighting strike.	Lightning, tornado, severe wind	Ongoing	Unknown	High	High	Town of Palmer Lake	Short-term	Goals 2, 5, & 6 Objectives 2.1, 2.2, 5.1, & 6.1
Initiative #82— Implement Emergency Notification System	Assess and improve existing emergency notification systems to ensure reliable,	All	Ongoing	Unknown	Low	High	Town of Palmer Lake	Long-term	Goals 1, 3, 5, & 6 Objectives 1.1, 1.2, 3.1,

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Within the Town (formerly #73)	diverse and redundant public communication of potential hazards								5.1, 6.1, 6.2, & 6.3
Initiative #83— Develop MOU with D38 for use of their facilities if needed (formerly #74)	Develop MOU with school district D38 and the Town of Monument for the use of their facilities in the event Town of Palmer Lake facilities are compromised	All	Ongoing	Unknown	Med	Low	Town of Palmer Lake	Short-term	Goals 1, 2, 3, 4, 5, & 6 Objectives 1.2, 2.3, 3.3, 4.1, 4.2, 4.3, 5.1, 5.3, 6.1, 6.2, 6.3
Initiative #84— Procure and Implement GIS Layer for High Risk Areas (formerly #75)	Procure and implement GIS layer for high risk areas to identify high risk areas and educate citizens.	All	Ongoing	Unknown	Low	Med	Town of Palmer Lake	Long-term	Goals 1, 2, 3, 4, 5, & 6 Objectives 1.4, 2.1, 2.2, 3.1, 3.2, 4.3, 5.1, 5.3, & 6.1
Initiative #85— Add a Link to the Town Website "Emergency Preparedness" (formerly #76)	Create an "Emergency Preparedness" link on the Town website with emergency prevention/preparedness information.	All	Ongoing	Unknown	Med	Low	Town of Palmer Lake	Short-term	Goals 1 & 3 Objectives 1.1, 3.1, 3.2, & 3.3
Initiative #86— Ensure Water Sheds have Adequate Fire Protection (formerly #77)	Ensure water tanks/water sheds have adequate fire protection by developing adequate alternative storage facilities via installation of water tanks, holding ponds etc.	Wildfire	Ongoing	Unknown	Low	Med	Town of Palmer Lake	Short-term	Goals 1, 2, 3, 4, 5, & 6 Objectives 1.3, 2.1, 2.2, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, & 6.1
Initiative #87— Co-create public awareness ads for floodplain management	TOPL will join Colorado Springs in Public Awareness ads concerning drainage, discharge, etc.	Flood	New	Identified for 2020 plan update.	Med	Low	Town of Palmer Lake, City of Colorado Springs	Short-term/ ongoing	Goals: 3 & 4 Objectives: 3.1, 3.2, 3.3, 4.1, 4.2 & 4.2
Initiative #88 - WQOS grant for local reservoirs	Project planning and grant application for a WQOS grant for local reservoirs	Drought	New/ In Progress	Identified for 2020 plan update. 18 month initiative and 6 months in	High	Low	Town of Palmer Lake	Short-term	Goal 2 Objective 2.2, 2.5
MANITOU SPRINGS INITIATIVES									
Initiative #89— Conduct Annual Review and Update of the City of Manitou Springs Emergency Operations Plan (formerly #78)	Conduct annual review and updates to the City of Manitou Springs EOP.	Severe Weather, Geologic, Wildfire, Hazmat, Dam	In Progress	This is in progress for 2020. Waiting Department Head input and will schedule for City Council review.	High	Low	Manitou Springs Fire Department	Ongoing	Goals 1, 2, 3, 4, & 5 Objectives 1.2,1.3,1.4,2.1, 2.2,3.3,4.2,5.1

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
		Failure, Flood, Mud or Debris Flow							
Initiative #90— City Hazard Mitigation Plan Update	The City of Manitou springs will submit a grant application in early 2021 or 2022 for a HMP plan update	All	New	Identified for 2020 plan update.	Med	Med	Manitou Springs Planning Department	Short-term	Goals: 1, 2, 3, 4, 5 & 6 Objectives: 1.2, 1.3, 1.4, 2.1, 2.2, 2.4, 2.5, 3.2, 2.2 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 5.4 & 6.1
Initiative #91— Defensible Space Development	Develop/maintain a defensible space for the south side of the City – dedicate staff time to identifying grant funds and approach, and additional analysis on where to concentrate our efforts.	Wildfire, Lightning	New	Identified for 2020 plan update.	High	High	City of Manitou Springs	Short-term	Goals: 1, 2, 5 Objectives: 1.3, 1.4, 2.2, 2.5, 5.1, 5.2
Initiative #92— Community Rating System Program Support	The City of Manitou Springs currently participates in the CRS program and will strive to reduce specific risk and vulnerabilities via federal, state, and local best practices.	Flood	New	Identified for 2020 plan update.	Med	Med	Manitou Springs Planning Department	Long-term	Goals: 1, 2, 5 Objectives: 1.3, 2.5 & 5.2
Initiative #93— Wildfire Protection Plan Implementation	Implement actions from City's Community Wildfire Protection Plan – dedicate staff capacity to implement. Focus on public education and mitigation workshops.	Wildfire	New	Identified for 2020 plan update.	High	High	City of Manitou Springs	Long-term	Goals: 1, 2, 3, 4, 6 Objectives: 1.3, 2.1, 2.2, 3.1, 3.2, 4.1, 4.2, 5.1
Initiative #94— Floodplain Mapping Update	Planning Department is participating in the El Paso County Discovery project to identify priority areas for updated floodplain mapping. (Improve data on flood risk and vulnerability)	Flood	New	Identified for 2020 plan update.	Med	Med	Manitou Springs Planning Department	Short-term	Goals: 1, 2 Objectives: 1.4, 2.1, 2.4
Initiative #95 - Public Works Office Remodel	Remodel Public Works offices to include new space for the City's Emergency Management Function. Both our Fire Department and City Hall are located in the floodplain, so this will prevent loss of operations/ emergency management during flood events.	All	New	Identified for 2020 plan update.	High	High	Manitou Springs Multiple Departments	Short-term	Goal: 2, 6 Objectives: 2.1, 6.1, 6.2
Initiative #96 - Conduct Training to Certify Fire Department Personnel in	Annual training and refresher provided to firefighters, includes completion of arduous fit test.	Wildfire	Ongoing	This an ongoing process. Annual training and refresher provided to firefighters, includes completion of	High	Med	Manitou Springs Fire Department	Ongoing	Goals: 1 & 4 Objectives: 4.1, 4.2 & 4.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Wildland Operation (formerly #80)				arduous fit test. Completed for season 2020					
Initiative #97 - Downtown Flood Mitigation Program	Program focuses on flood mitigation techniques for downtown property owners; city staff will explore possible funding and programmatic approaches for continued support.	Flood	New	Identified for 2020 plan update.	High	High	Manitou Springs Recovery Manager	Long-term	Goals: 2, 3 & 6 Objectives: 2.1, 2.2, 2.5, 3.3 & 6.1
Initiative #98: Floodplain Management and Permitting	Develop a stronger floodplain management program and regulations beyond the State's minimum requirements. Begin by forming workgroup; evaluating programs in other small communities; and assigning staff capacity for CFM training.	Flood	Not started/ New	Identified for 2020 plan update. Some CRS responsibilities shifted from PPRBD to City. Planning staff will begin by assessing/evaluating participation in CRS program.	High	Med	Planning Department	Long-term	Goal: 5 Objectives: 5.1, 5.2
Initiative #99: Building Code Enforcement	Expand code enforcement capabilities as resources allow, with the goal of increasing building code enforcement capability.	All	Not started/ New	Identified for 2020 plan update. Financial constraint from public health emergency; consider alternate approaches.	Med	High	Planning Department/ Police Department	Med- to long- term	Goals: 1, 5 Objectives: 1.3, 5.1, 5.2
Initiative #100: Floodplain compliance incentives	Develop a strategy and incentives to bring private commercial and residential structures into compliance with state and federal floodplain standards. Decrease vulnerability of existing structures in floodplain.	Flood	Not started/ New	Identified for 2020 plan update. This is challenging because owners may not have additional resources, and there are few examples of this in our region.	Low	High	Planning Department	Long-term	Goals: 1, 2, 5 Objectives: 1.3, 2.2, 5.2
Initiative #101: Historic Building upgrades	Identify funding sources for low-interest loans to owners of historic structures to address hazard vulnerabilities, primary flood.	All	Not started/ New	Identified for 2020 plan update. This program would require staff capacity and some outside resources.	Low	High	Planning Department	Med- to long- term	Goal: 2 Objectives: 2.1, 2.5
Initiative #102: Provide financial support for structural flood mitigation for private properties	Develop a package of funding mechanisms for seed money to fund flood mitigation projects.	Flood	Not started/ New	Identified for 2020 plan update. Capacity needed to pursue FEMA and other grant sources.	Low	Med	Planning Department	Med	Goals: 2, 5, 6 Objectives: 2.1, 2.5, 5.2, 6.1
Initiative #103: Acquire easements or right-of-ways of creeks.	Property along creeks is mostly privately held, which poses challenges for maintenance and restoration. Consider doing this in key locations as part of Creek walk trail.	Flood	Not started /New	Identified for 2020 plan update. City needs to better understand legal framework and maintenance costs.	Low	High	Planning Department	Long-term	Goals: 1, 2, 5 Objectives: 1.3, 2.2, 5.2
Initiative #104: GIS Data System & capability improvements	Improve GIS data, analysis capabilities, and maps for hazard and risk information for City decision-making and public education.	All	Ongoing/New	Identified for 2020 plan update. Improved data for wildfire and geologic hazards. Discovery project will improve floodplain data.	Med	Low	Planning Department/ Public Works Department	Short-term	Goals: 1, 3, 4 Objectives: 1.3, 1.4, 3.3, 4.1

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #105: Assess vulnerability of structures along Fountain Creek.	Housing and historic/cultural properties are at risk and in need to repair/structural improvements. Suggest a 2-phase approach to identify priorities.	Flood	Not started/ New	Identified for 2020 plan update. Potentially move forward in 2021, if available staff capacity.	Med	Med	Planning Department	Phase 1: Short-term, Phase 2: Med-term	Goals: 2, 5 Objectives: 2.1, 5.2
Initiative #106: Establish a procedure for structural evaluation and enforcement post-disaster.	Following 2013 flooding, some structures were posted "uninhabitable," but City did not have mechanism to enforce requirement to vacate.	All	Not started/ New	Identified for 2020 plan update. Limited budget for consultant services is required.	Low	Low	Planning Department	Med to long-term	Goals: 2, 5 Objectives: 2.1, 2.2, 5.1, 5.2
Initiative #107: CDOT collaboration to mitigate roadway issues	Coordinate with CDOT to promote and support mitigation of slope failure, rockfall, drainage, and erosion issues along US Highway 24.	Flood, geologic	Not started/ New	Identified for 2020 plan update. Identify staff capacity to initiate outreach with CDOT. Potential range of funding sources to assist.	Med	Med	Public Works	Short-term	Goal: 2, 4, 6 Objectives: 2.4, 2.5, 4.1, 4.2, 6.1
Initiative #108: work with CSU to Identify vulnerabilities and Improvements to overhead Electrical Infrastructure	Work with Colorado Springs Utilities to identify vulnerabilities and needed improvements in the electrical system and to improve coordination on the tree trimming program to protect power lines.	All	Not started/ New	Identified for 2020 plan update. Identify staff capacity to initiate outreach with CDOT.	Low	Med	Public Works	Med to long-term	Goal: 2, 4, 6 Objectives: 2.1, 4.1, 4.2, 6.1
Initiative #109: address ingress/egress	Address hazard-related ingress/egress issues on City's west side at US Highway 24 Business and Serpentine Drive, to ensure it is functional during flood and wildfire events.	All	In Progress/New	Identified for 2020 plan update. City is currently assessing infrastructure and maintenance needs within this corridor.	Low	High	Public Works Department/Planning Department	Med to Long-term	Goal: 2, 6 Objectives: 2.1, 2.2, 6.1
Initiative #110: Implement Englemann Canyon pilot project.	Wildfire and subsequent flood/debris flow in Englemann (Ruxton) Canyon is a worst-case scenario for City. In 2015, Hazard Mitigation team pursued CDBG-DR watershed funding for fuels reduction and flood mitigation.	Wildfire	Not started/ New	Identified for 2020 plan update. Capacity and specific expertise would be required to manage this complex project.	Med	High	Public Works	Short-term	Goals: 2, 5, 6 Objectives: 2.1, 2.5, 5.2, 6.1
Initiative #111: Conduct an inventory of retaining walls that support vehicular right-of-ways.	Retaining walls (some historic) are vulnerable to failure along Fountain Creek, Ruxton Creek, Serpentine Avenue, Spencer Avenue, Highway 24 at Crystal Hills Boulevard, and other roadways.	Geologic	Not started/ New	Identified for 2020 plan update. Potential information may be obtained from Ruxton Avenue survey.	Low	Med	Public Works Department	Long-term	Goal: 1, 2 Objectives: 1.4, 2.1
Initiative #112: Public Facilities and parks mitigation	Assess vulnerability of public facilities and parks located in the 1% chance floodplain and prioritize mitigation opportunities.	Flood	Ongoing/New	Identified for 2020 plan update. Staff will consider addressing this in Parks and Facilities Master Plan.	Med	Med	Public Works Department	Long-term	Goal: 1, 2 Objectives: 1.4, 2.1
Initiative #113: Update and improve household preparedness communication and outreach program.	The City needs to inform and educate residents, business owners, and visitors about hazard risks, vulnerabilities, mitigation, and preparedness. This action supports development of a comprehensive	All	Ongoing/New	Identified for 2020 plan update. In 2020, Public Information Officer updated City's Hazard Preparedness/ Mitigation website and launched updated messaging.	High	Low	Public Information Officer, with input from Planning and	Ongoing	Goal: 3 Objectives: 3.1, 3.2, 3.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
	Communications Plan that would also incorporate vulnerable populations.						Fire Departments		
Initiative #114: Update flash flood awareness campaign.	Flash flooding is a life safety concern, and residents in City's downtown may be unaware of risk.	Flood	Ongoing/New	Identified for 2020 plan update. Consider both printed and online communications.	High	Low	Public Information Officer, with input from Planning and Fire Depts	Ongoing	Goal: 3 Objectives: 3.1, 3.2, 3.3
COLORADO SPRINGS INITIATIVES									
Initiative #115- Wildfire Mitigation Education and Outreach to Neighborhoods at Risk (formerly W2)	Continue conducting wildfire presentations to neighborhoods in order to educate them on mitigation concepts. One consideration for project prioritization is based on the receptiveness of the community.	Wildfire	Ongoing	PPROEM hosted two community meetings focused on wildfire, flood and geological hazards in partnership with several organizations including the Division of the Fire Marshal, the Independence Center, and others. Colorado Springs Fire Department Wildfire Mitigation program continued to provide education to residents and homeowners. City Communications conducted social media wildfire mitigation and prevention messaging.	High	Low/ staff time	Division of the FM	Ongoing	Goals: 3 Objectives: 3.1, 3.2 & 3.3
Initiative #116- Wildfire Mitigation Fuel Reduction Activities (formerly W3)	Continue fuels reduction activities to include neighborhood chipping, creating defensible around homes using residential stipends, prescribed burning in remote areas, and hazard fuel reduction projects in common areas and open spaces.	Wildfire	Ongoing	Colorado Springs applied for a Colorado Department of Natural Resources Wildfire Risk Reduction Grant Program grant and will continue to apply for future ones	High	Med to High	Division of the FM	Ongoing	Goal 1 & 2 Objectives 1.4, 2.1, 2.2 & 2.5
Initiative #117- Wildfire Mitigation Outreach to the Business Community (formerly W4)	Expand Business Education and Outreach about wildfire concerns, evacuation, and business continuity. Continue integration with the Division of the Fire Marshal's current efforts focused on businesses and healthcare facilities. Explore expanding outreach to adopt an all-hazards perspective in partnership with OEM.	Wildfire	Ongoing	Current efforts among the Division of the Fire Marshal and American Red Cross to discuss the importance of maintaining continuity of operations. The Colorado Springs Fire Department Wildfire Mitigation Section provides free development reviews, on-site consultations, vegetation management reviews and inspections.	Med	Low/ Staff time	Division of the FM and OEM	Ongoing	Goals: 3 and 6 Objectives: 3.1, 3.2, 3.3 & 6.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #118- Templeton Gap Floodway Accreditation (formerly F1)	Obtain documentation regarding the floodway's accreditation status from USACE and FEMA. Determine if the City should seek accreditation.	Flood, Levee failure	In Progress	A 5-year study is being conducted by FEMA that will more accurately map risk and identify ways to reduce risk. Water Resources Engineering Division will apply for a self-accreditation of the levee using the USACE report from 2017 and the study currently being performed by FEMA	Low	Low/ staff time	Public Works/ Stormwater	Short-term	Goals: 1 & 2 Objectives: 1.4 & 2.4
Initiative #119- Assess Flood Risk for Critical Populations (formerly Initiative F2)	Assess the risk for facilities with critical populations (schools, nursing homes, etc.). Consider the need for site-specific EAPs for locations.	Flood, Dam/ Levee Failure	Ongoing	City Planning has the 100- and 500-year floodplain overlay available on the website which shows all facilities potentially impacted. PPRBD provides input into plans and permits for buildings within the floodplain. The City maintains EAPs for appropriate dams and has Continuity of Operations Plans for city operations.	Med	Low/ staff time	City Planning, Pikes Peak Regional Building Department	Short-term	Goals: 1, 2 & 5 Objectives: 1.4, 2.4 & 5.4
Initiative #120- Educate Critical Populations of Flood Risk (formerly F3)	Educate critical populations (schools, nursing homes) of their flood risk and the need to take safety measures. Second step is to assess the risk for critical facilities.	Flood, Dam/ Levee Failure	Ongoing	PPROEM in collaboration with CSFD Fire Mitigation and CSFD Wild Land held two community meetings that focused on flood and wildfire risk and preparedness. City Communications implemented a robust flash flood awareness campaign in tandem with public meetings to provide awareness and information resources to the general public.	High	Low/ staff time	OEM, Fire Department, Public Information Office (PIO), City Communications	Ongoing	Goals: 1, 2 & 3 Objectives: 1.3, 2.1, 3.1 & 3.3
Initiative #121- Mitigation on Non-Burn Scar Area Streams (formerly F5)	Implement mitigation actions on non-burn scar streams including: o In-channel improvements for stability o Detention o Zero run-off increase from new development	Flood	Ongoing	In 2018, the City implemented the Stormwater Infrastructure Master Plan. The master plan includes an annual assessment of all City natural channels. Channels identified by this process as being in critical condition will be prioritized ahead of other capital projects. All natural channels are re-assessed on an annual basis.	Low	Med to High	Public Works/ Stormwater	Ongoing	Goals: 2 & 5 Objectives: 2.2, 5.1, 5.2 & 5.4

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #122- Burial of Utilities (formerly SW1)	Continue to bury utilities underground as feasible.	Severe Weather	Ongoing	Colorado Springs Utilities continues operations to bury utilities underground, where feasible.	Low	High	CSU	Ongoing	Goals: 2 & 6 Objectives: 2.1, 2.2, 2.5 & 6.1
Initiative #123- Tree Trimming and Vegetation Management (formerly SW2)	Continue to trim trees and vegetation along power line corridors and infrastructure. Evaluate whether the City can support vegetation trimming via cost-sharing	Severe Weather	Ongoing	Colorado Springs Utilities continues to monitor tree growth around power lines and retains a contract with tree trimmers as well as maintaining an in-house team.	Low	Low to Med	CSU, City Forestry, Parks and Recreation Coordination needed with Fire Dept for chipping	Ongoing	Goals: 2 Objectives: 2.1, 2.2 & 2.5
Initiative #124- Severe Weather Public Outreach and Education (formerly SW3)	Provide more information and outreach to the public on hazardous weather risks and mitigation actions so they can better protect themselves and property.	Severe Weather	Ongoing	CSU places information on billing statements, on its website, and joint partner opportunities. The City Communications Public Education plan contains seasonal awareness campaigns.	High	Low	City Communications, National Weather Service	Short-term/ ongoing	Goals: 3 Objectives: 3.1, 3.2 & 3.3
Initiative #125- Public Messaging to Avoid Hazardous Areas (formerly SW5)	Purchase variable message signs for use at key locations to warn motorists of ice so they can avoid these areas.	Severe Weather	Ongoing	CSU - All major partners use their standard messaging protocols to include Public Information Officers (PIOs) throughout the Pikes Peak Region, social media, websites, variable message boards and media outlets.	High	Low	City Streets	Ongoing	Goals: 3 & 4 Objectives: 3.1, 3.2 & 3.3
Initiative #126- Landslide Monitoring (formerly G1)	The City should proactively monitor landslides with GPS, pendulum technology or other appropriate monitoring system.	Landslide	Ongoing	In 2018 the City's consultant drilled several borings in the Southwest portion of the City to better understand the geology. The monitoring equipment will be read at regular intervals for the first two years after installation. The monitoring consultant contract was renewed for 2019 to continue gathering data from the monitoring points.	High	Low/ Staff time	City Building Department, OEM	Ongoing	Goals: 1, 2 & 5 Objectives: 1.3, 1.4, 2.1 & 5.4
Initiative #127- Landslide City Codes and Design Criteria (formerly G3)	Evaluate the need to modify building codes for landslide susceptible locations within the City's limits. Modify and enforce landslide mitigation requirements and work to ensure against building in areas identified as at-risk to landslides.	Landslide	In progress	Codes will be impacted and informed by study and surveying. The Colorado Geological Survey (CGS) reviews Geological Hazard reports; requirements are currently enforced.	Med	High	City Planning Department/ Pikes Peak Regional Building Department	Short-term	Goals: 1, 5 Objectives: 1.4, 5.4

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #128 - Property Acquisition (Initiative G4)	Coordinate the acquisition of eligible properties with property owners and State/Federal programs.	Flood	In progress	Property procurement is actively in process as part of the Hazard Mitigation Grant Program. This is an ongoing process and is expected to be complete in 2020.	Med	High	Public Works, OEM, Parks and Recreation, Real Estate Services, Planning	Short-term	Goals 2 Objectives 2.1, 2.2 & 2.5
Initiative #129- Subsidence	Gather and analyze information on subsidence.	Subsidence	New/ In progress	This goal is added based on increased subsidence occurring within the city. Public Works will be conducting additional investigation in the Cragmoor neighborhood in 2020 depending on funding.	High	Staff time	Public Works	Short-term	Goals: 1, 2 Objectives: 1.4, 2.2 & 2.5
Initiative #130- Subsidence	Reach out to the affected neighborhoods, Council of Neighbors and Organizations, and HOAs to provide them with information on subsidence assistance opportunities such as the Mine Subsidence Program.	Subsidence	New/ Not Started	This goal is added based on the increased subsidence occurring within the city. No change to date.	High	Staff time to Low	PPROEM, City of Colorado Springs Finance, Public Works	Short-term	Goals: 3 Objectives: 3.1, 3.2 & 3.3
Initiative #131- Terrorism Public Awareness (formerly H1)	Continue Public Awareness on terrorism risk: o Promote public awareness campaign of shared responsibility and how the public should notify law enforcement of suspicious behavior ("See something, Say something") o Sustain capability to use Integrated Public Alert and Warning System (IPAWS) o Continue support of Civil-Military Emergency Management Collaborative	Acts of violence	Ongoing	City Communications uses the State campaigns. The buildings at increased risk have been identified. Colorado Springs and El Paso County Public Safety Dispatch centers maintain the Integrated Public Alert and Warning System (IPAWS) and Civil-Military Emergency Management Collaborative meetings.	High	Low/ Staff time	CSPD, Communications, PIO, OEM	Ongoing	Goals: 3 & 4 Objectives: 3.1, 3.2, 3.3, 4.1 & 4.3
Initiative #132- Collaboration to Address Terrorism Risk (formerly H2)	Enhance collaboration and coordination among Law Enforcement, Emergency Management, and other intelligence-gathering agencies to address terrorism threats o increase participation in monthly Regional Threat Working Group meetings with CIAC which are focused on terrorist/criminal threat. CSU also has a monthly meeting. o Coordinate with Colorado DHSEM security representative.	Acts of violence	Ongoing	2018 - CSFD works with private partners and the Civil Support Team to improve HAZMAT response coordination. CSU still supports the Regional Threat Working Group and has staff with clearance to attend CIAC meetings. CSFD worked with CSU on response to possible attacks to chlorine storage facilities and also addressed illegal dumping into waterways. Coordinated with CSPD and OEM on CSFD response to possible terrorist attacks to target buildings.	High	Low /Staff time	CSPD, Colorado DHSEM, CIAC, CSU	Long-term	Goals: 4 Objectives: 4.1, 4.2 & 4.3

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Initiative #133- Hazardous Materials Readiness and Warning Capabilities (formerly H3)	Continue improving readiness and warning to appropriate officials and public for potential HAZMAT incidents for public safety and to reduce secondary impacts o Sustain capability of using IPAWS for public warning o Continue to plan HAZMAT exercises o Prepare pre-scripted messages for IPAWS o Consider ways to quickly inform public. Work with media.	Hazmat	Ongoing	CSFD and PPROEM continue to maintain IPAWS. A HAZMAT specific exercise training was held which involved COS HAZMAT Team, OEM and CSPD. This training is ongoing to continue to evaluate the response. City Communications continues to use the Crisis Communications and Joint Information System Plans to organize and disseminate information. PPROEM will work with dispatch to determine the status and content of messages.	High	Low/ Staff time	OEM, CSPD Communications, CSFD	Short-term/ ongoing	Goals: 1, 3 & 4 Objectives: 1.1, 3.3, 4.1, 4.2 & 4.3
Initiative #134- Coordination with Railroad on Hazardous Materials Incidents (formerly H5)	Continue to coordinate with the railroad industry to improve collaboration and response in case of large HAZMAT incident	Hazmat	Ongoing	CSFD continues to verify that rail partners are on the distribution list for the LEPC meetings. CSPD Homeless Outreach Team works with rail partners on a regular basis. CSFD HAZMAT, PPROEM, and HMRT have AskRail app on smartphones. Dispatch has a direct line to the railroads and HAZMAT response staff are sent to rail training. CSFD sent members of the Hazardous Materials Response Team (HMRT) to specialized rail training.	Med	Low/ Staff time	OEM, CSFD	Short-term/ ongoing	Goals: 1 & 4 Objectives: 1.1, 4.1
Initiative #135- Enhance Public Education on Infectious Disease (formerly H6)	Continue public education for infectious disease on several topics including vaccinations, emerging diseases, and things to avoid (e.g., animal carcasses). Raise awareness of El Paso County Health Department's website.	Pandemic/ Epidemic	Ongoing	El Paso County Public Health (EPCPH) publishes a weekly newsletter entitled "What's Going Around" that provides a weekly snapshot of disease trends in EPC. Current topics in local epidemiology trends are also shared at quarterly healthcare coalition meetings. PPROEM is an active participant in the healthcare coalition. EPCPH educated over 650 people at 17 events on infectious disease topics.	Med	Med/ Staff time	EPCPH, CDPHE	Short-term/ ongoing	Goals: 3 Objectives: 3.1, 3.2 & 3.3
Initiative #136- Evaluate Infectious Disease	Review response operations to intervene and stop the spread of infectious disease o Maintain awareness of infectious disease	Pandemic/ Epidemic	Ongoing	EPCPH hosted a functional exercise, "Making Rash Decisions" that tested the EPCPH Quarantine and Isolation	Med	Med	EPCPH, OEM CDPHE, CSPD,	Ongoing	Goals: 1,3, 4 & 6 Objectives: 1.1, 1.4, 3.1,

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
Response Operations (formerly H7)	response roles and responsibilities o Maintain a strong relationship with EPCPH o Participate in Public Health Exercises o Educate public on what would happen if they were quarantined and resources that can support during it o Conduct an exercise for setting up Point of Dispensing locations			as well as the Epidemiological Response Plans. EPCPH also partnered with CSPD's Homeless Outreach Team to provide effective hepatitis A vaccine outreach to homeless and drug-using populations during the 2019 outbreak of hepatitis A in EPC. In partnership with the SCHCC, EPCPH also coordinates call down drills to ensure communications capability needed for Points of Dispensing or other public health response.			El Paso Sheriff's Office		4.1, 4.2, 4.3 & 6.3
Initiative #137- Cyber Threat Education and Awareness (formerly H8)	Implement education and awareness activities for City of Colorado Springs employees to reduce cyber threats and hacking via phishing attacks. Formalize training program and Tabletop Cyber Scenarios.	Cyber-Attack	Ongoing	Cybersecurity training was provided to different City Departments and business partners. City IT along with PPROEM conducted two IT only tabletop exercises and a Ransomware tabletop exercise with the Mayor and many of the City Department Leaders. Both City IT and Colorado Springs Utilities have programs that inform employees about proper measures to mitigate threats.	High	Med	IT, OEM	Short-term	Goals: 3 Objectives: 3.1, 3.2 & 3.3
Initiative #138- Continuity of Operations (Initiative H9)	Evaluate Continuity of Operations scenarios if technology is incapacitated (e.g., no phones, no computer) o Use of 800 megahertz, VHF, and ham radios, hardline phones, and courier services o Conduct exercises o Explore contracting with mobile companies that can help restore functionality to internet	Cyber-attack	Ongoing	The Amateur Radio Emergency Services and 800 MHz radios are used and tested on a regular basis. PPROEM, CSPD, and CSFD have Government Emergency Telecommunications Service cards to help ensure that first responders have priority communication access. PPROEM is also testing First Net and Verizon Priority. All CSFD Sworn and Civilian wireless phones are now First-Net capable.	High	Med	OEM IT, OEM, CSPD, CSFD, Contracting (for agreements)	Short-term	Goals: 1,3, 4 & 6 Objectives: 1.1, 1.4, 3.1, 4.1, 4.2, 4.3 & 6.3
Initiative #139- Bear Creek 2018 PDM Project	Install a drop structure and bio-engineering treatments to repair the channel head cut and stabilization of the creek banks.	Flood	New/ In Progress	Identified for 2020 plan update. PDM Grant secured during the 2018 selection cycle. Construction will begin in 2021.	High	Low	City of Colorado Springs	Short to mid-term	Goals: 2 & 5 Objectives: 2.1, 2.2, 2.5, 5.1 & 5.2

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
							Stormwater Enterprise		
Initiative #140- Cottonwood Creek PDM Project	This project proposes to stabilize the creek with drop structures and the channel banks with bio-engineering treatments, where applicable. In addition the project will repair the damaged Stormwater outfall. The project will also provide water quality improvements in compliance with the City of Colorado Springs 4-Step Process.	Flood	New/ In Progress	Identified for 2020 plan update. PDM Grant secured during the 2018 selection cycle. Construction will begin in 2021	High	Low	City of Colorado Springs Stormwater Enterprise	Short to mid-term	Goals: 2 & 5 Objectives: 2.1, 2.2, 2.5, 5.1 & 5.2
Initiative #141- BRIC Sand Creek	Connect previous stabilization projects upstream and downstream from this project area. This reach from Palmer Park Boulevard at the upstream end to Galley Road at the downstream end will include consistent treatment that exists on adjacent reaches. The project proposes to stabilize the channel banks and provide protection up to the 100-year flood discharge through channel grading, drop structures, bank armoring, bioengineering, vegetation, and other methods.	Flood	New	Identified for 2020 plan update. BRIC Grant Application during the 2020 selection cycle. If selected, design will take 9 months and construction will take 6 months.	High	Low	City of Colorado Springs Stormwater Enterprise	Long-term	Goals: 2 & 5 Objectives: 2.1, 2.2, 2.5, 5.1 & 5.2
Initiative #142- BRIC Monument Creek	The project will stabilize a section of Monument Creek that is threatening Mark Dabling Road and several utilities that run along Mark Dabling and cross the creek just upstream of the Cottonwood Creek confluence. Improvements to the reach will include consistent treatment that exists on adjacent reaches. The project proposes to stabilize the channel banks and provide protection up to the 100-year flood discharge through channel grading, drop structures, bank armoring, bioengineering, vegetation, and other methods.	Flood	New	Identified for 2020 plan update. BRIC Grant Application during the 2020 selection cycle. If selected, design will take 9 months and construction will take 6 months.	High	Low	City of Colorado Springs Stormwater Enterprise	Long-term	Goals: 2 & 5 Objectives: 2.1, 2.2, 2.5, 5.1 & 5.2
Initiative #143- BRIC Monument Branch	Stream stabilization of approximately 2,400 linear feet on the east side of Interstate 25 (I-25), between the United States Air Force	Flood	New	Identified for 2020 plan update.	High	Low	City of Colorado Springs	Long-term	Goals: 2 & 5 Objectives: 2.1,

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with Goals and Objectives
	Academy (USAFA) property line and Voyager Parkway. Monument Branch is a natural, sandy channel that has experienced extreme erosion. The erosion is now threatening several utilities crossing the creek and Voyager Parkway. Stabilizing these sections of the channel will mitigate against erosion, provide a long-term solution to the entire reach, and protect the existing vulnerable infrastructure.			BRIC Grant Application during the 2020 selection cycle. The project has already been designed and is ready to implement upon grant award. The construction would begin in the fall of the year the grant is awarded and extend into the spring of the following year allowing for completion of the project within 24 months of contract award.			Stormwater Enterprise		2.2, 2.5, 5.1 & 5.2
Initiative #144- BRIC Cottonwood Creek Stabilization Project	The Cottonwood Creek Stabilization Project will provide stabilization control measures in Cottonwood Creek downstream of Powers Boulevard for about 3,000 feet. These stabilization measures will protect Woodmen Road and Colorado Springs Utilities Infrastructure from risk of failure due to eroding and vertical cut banks in exceedance of 20 feet. Project highlights include the establishment of stable slopes, a low-flow channel in Cottonwood Creek, fill to placed in the channel, drop structures, and green solutions utilized throughout the project footprint.	Flood	New / In Progress	Identified for 2020 plan update. A 30% design of the reach of creek from Austin Bluffs Parkway to Powers Boulevard has already been contracted by the City and will be completed by the end of 2020. Upon award of the grant the City will complete the final design for this stretch of the creek with construction following in the subsequent Fall. Construction should take 6 to 9 months so that the entire project is completed within 24 months of grant award.	High	Low	City of Colorado Springs Stormwater Enterprise	Long-term	Goals: 2 & 5 Objectives: 2.1, 2.2, 2.5, 5.1 & 5.2

5.4 CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

El Paso County and its incorporated communities participate in the NFIP program. Each community (exempting Ramah) also participates in the CRS program with classifications ranging between 5 and 7. The incorporated communities in the Pikes Peak Region will continue participation in and compliance with the NFIP. Activities recommended to undertake for continued compliance include the following:

- Adopt and enforce floodplain management requirements, including regulating new construction in Special Flood Hazard Areas (SFHAs)
- Work with FEMA and the State in the Risk MAP program and adopt new DFIRMs when effective
- Improve education and outreach efforts regarding flooding throughout the region
- Maintain Class rating in the CRS program; and/or strive for enhanced score in next five years.

Chapter 6 | Plan Implementation and Maintenance

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Chapter 6 | Plan Implementation and Maintenance

Plan Requirements

FEMA Requirements

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

44 CFR Requirement §201.6(c)(4)(iii): The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.

EMAP Standards (2019)

Standard 4.1.3: The Emergency Management Program has a maintenance process for its Hazard Identification and Risk Assessment identified in Standard 4.1.1 and the Consequence Analysis identified in Standard 4.1.2, which includes a method and schedule for evaluation and revision.

Standard 4.2.3: The Emergency Management Program has a process to monitor overall progress of the mitigation activities and documents completed initiatives and their resulting reduction or limitation of hazard impact on the jurisdiction.

This chapter details the formal process that will ensure that the Pikes Peak Regional Multi-Hazard Mitigation Plan remains an active and relevant document and that El Paso County and its incorporated jurisdictions maintain their eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every five years. This chapter also describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The process outlined in this section meets the intent of EMAP Standard 4.1.3 and 4.2.3 by providing a clear monitoring schedule and process that documents progress prior to the next update.

6.1 FORMAL PLAN ADOPTION AND RESPONSIBLE PARTIES

A hazard mitigation plan must document that it has been formally adopted by the governing body of the jurisdiction requesting federal approval of the plan (44 CFR Section 201.6(c)(5)). For multi-jurisdictional plans, each jurisdiction requesting approval must document that is has been formally adopted. All participating jurisdictions fully met the participation requirements specified and will seek DMA compliance under this plan. The Plan will be submitted for a pre-adoption review to Colorado Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency Region VIII prior to adoption. Once pre-adoption approval has been provided, all participating jurisdictions will formally adopt the plan. All jurisdictions understand that DMA compliance and its benefits cannot be achieved until the plan is adopted. Copies of the resolutions adopting this plan for all partnering jurisdictions can be found in Appendix E.

6.2 IMPLEMENTATION OF MITIGATION ACTIONS

Once updated and adopted, this Plan is intended to be implemented so that the Region's vulnerability to natural and human-caused hazards decreases over time. Two factors will help PPROEM and the LPC determine how to prioritize implementing actions: 1) the priority assigned to actions identified in the planning process; and 2) the availability of funding. Low or no-cost projects can sometimes most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective benefits of each project to the community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe and sustainable community.

Simultaneous to these efforts, the PPROEM and LPC will constantly monitor funding opportunities that could be leveraged to implement some of the more costly actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the County and partnering jurisdictions will then be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective projects.

6.3 LOCAL PLANNING COMMITTEE

The LPC is a volunteer body that participated in the Plan development process. After adoption of the Plan, it is recommended that the LPC remain a viable body to provide guidance on key elements of the Plan Maintenance Strategy. The committee should strive to include representation from the participating jurisdictions, as well as other stakeholders in the planning area. The LPC's primary role is to assist PPROEM

in monitoring Plan implementation. The role of the LPC, in its assistance to PPROEM, in implementation and maintenance includes:

- Act as a forum for hazard mitigation issues
- Disseminate hazard mitigation ideas and activities to all participants
- Pursue the implementation of high-priority, low/no-cost recommended actions
- Keep the concept of mitigation in the forefront of community decision-making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists
- Assist in implementation and update of this plan

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County and/or municipal websites and local newspapers.

6.4 PLAN MONITORING AND EVALUATING

Plan maintenance is an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized. The Pikes Peak Regional OEM will serve as the primary point of contact and will coordinate all local efforts to monitor, evaluate, and update the Plan.

In order to track progress and update the mitigation strategies identified in the action plan, the LPC and/or selected stakeholders will revisit this Plan annually or after a significant hazard event or disaster declaration. The PPROEM Director and staff will be responsible for initiating this review and engaging stakeholders on a once yearly basis, or as needed. The purpose will be the following:

- Report on usefulness of the Plan and the progress on mitigation actions
- Report on any input received from the public
- Discuss hazard events and observations
- Report on how the plan has been incorporated into other planning mechanisms
- Discuss mitigation issues and ideas
- Work to secure funding and identify multi-objective, cost-share, and other opportunities for partnerships
- Discuss how to keep the attention of community leaders and the public on hazard mitigation problems and opportunities
- Discuss new sources for data to improve future updates
- Make recommendations on specific updates to the plan

- Report on plan progress and recommended changes to community governing boards

A representative from the responsible entity identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the OEM on project status. The Planning Team has created a template to guide each responsible entity in preparing a progress report (see Appendix C). These progress reports will serve as criteria by which the mitigation strategy may be evaluated. PPROEM will compile input and produce a consolidated annual report.

After considering the findings of the submitted progress reports, the City Council, County Administration, and/or the LPC may request that the implementing department or agency meet to discuss project conditions. Should review of the Plan warrant changes prior to the five-year update cycle, a notice and revised document will be provided to the City Council, County Administration, the state and FEMA following the review and update.

Local hazard mitigation plans must be revised, updated and resubmitted for approval every 5-years from the data of plan adoption in order to remain eligible for benefits under the DMA (44 CFR, Section 201.6(d)(3)). The Pikes Peak Regional OEM intends to update the hazard mitigation plan on a 5-year cycle from the date of initial plan adoption. This cycle may be accelerated to less than 5 years based on the following triggers:

- A Presidential Disaster Declaration that impacts the planning area
- A hazard event that causes loss of life
- A comprehensive update of the County or participating jurisdictions comprehensive plan

It will not be the intent of future updates to develop a complete new hazard mitigation plan for the planning area. The update will, at a minimum, include the following elements:

- The update process will be convened through PPROEM.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The initiatives will be reviewed and revised to account for any initiatives completed, dropped, or changed and to account for changes in the risk assessment or new partnership policies identified under other planning mechanisms (such as the comprehensive plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The partnership governing bodies will adopt their respective portions of the updated plan.

6.5 CONTINUING PUBLIC PARTICIPATION

The public will continue to be apprised of the plan's progress through the Pikes Peak Regional Office of Emergency Management website. This site will not only house the final plan, it will become the one-stop

shop for information regarding the plan, status updates, the partnership and plan implementation. Copies of the Plan will also be available upon request.

OEM and other members of the LPC will also identify opportunities to raise community awareness about the Plan and the hazards that affect the region. This effort could include attendance and provision of materials at City or County events, school-sponsored events, activities of the fire protection districts, through the American Red Cross, events through other organizations, or by public mailings. Any public comments received about the Plan will be collected by OEM and included in the Annual Plan Progress Report.

6.6 INCORPORATION INTO EXISTING PLANS AND PROCEDURES

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science, data and technology available at the time this plan was prepared. The El Paso County Master Plan and the comprehensive plans of the partner jurisdictions are considered to be integral parts of this plan.

The Planning Team is proud of the coordination that occurred to integrate into the El Paso County Master Plan Update, that was occurring at the same time as this update. It is notable that the El Paso County Master Plan Update, during this collaboration, had developed a focus on preserving open space for the purpose of aesthetics and community character. As part of this strategies such as cluster subdivisions were identified. PPROEM was able to connect with Master Plan Update team to share how these concepts can be strengthened to also protect life, safety and property by pairing strategies that conserve open space with areas that are also posed to have development in areas with hazard risk exposure.

We were also able to leverage recent planning efforts in Manitou Springs, where the comprehensive plan and hazard mitigation plan are combined. We incorporated many of their referenced strategies and reference back to their risk analysis to support this work. Their connections back to policies and land use were beneficial when considering their mitigation strategy.

Colorado Springs will soon be embarking on a rezoning effort. This will be a key opportunity to ensure alignment between this hazard mitigation plan and the process to update the zoning code. While the Comprehensive Plan focus does not include hazard mitigation, there are opportunities to align the goals around open space and park preservation, as well as increased density, through this zone update.

Calhan and Ramah will be updating town codes and ordinances to protect sensitive natural areas and open spaces. The new codes will encourage development to protect watersheds and terrain, to preserve significant vegetation and scenic views, and to incorporate native trees and shrubs into landscape plans. Additionally, implementation of floodplain management procedures is identified by Calhan and Ramah as an initiative to be pursued in the upcoming years. Given the upswing of large and erratic fires within the planning area, Fountain, through development of a Community Wildfire Protection Plan, is taking steps to reduce their risk. Further, in 2019, Green Mountain Falls completed a new comprehensive plan in which they speak to plans for an updated Emergency Disaster Plan and Palmer Lake has identified intent to adopt several new ordinances intended to protect natural resources and water supplies.

The County and partner municipalities, through adoption of comprehensive plans and zoning ordinances, have planned for the impact of natural hazards. The plan development process provided the County and

partnering jurisdictions with the opportunity to review and expand on policies contained within these planning mechanisms. The partnering jurisdictions can use their comprehensive plans and the hazard mitigation plan as complementary documents that work together to achieve the goal of reducing risk exposure to the citizens of the planning area. An update to a comprehensive plan may trigger an update to the hazard mitigation plan.

Other planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan include the following:

- Partners' emergency response plans
- Master or comprehensive plans
- Capital improvement programs
- Economic Development plans
- Building Codes
- Zoning, subdivision, and floodplain ordinances
- Community design guidelines
- Urban renewal plans
- Historic preservation plans
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Master fire protection plans
- Evacuation plans
- Other plans and policies outlined in the Capability Assessment (Chapter 3)

Some initiatives do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this Plan, that information will be incorporated via the update process.

Incorporation of plan elements into existing planning mechanisms will require coordination between OEM and the staff of the department responsible for drafting the plan document. This will ensure that the relevant elements of this Plan are taken into consideration.

Chapter 7 | Appendices

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APPENDIX A: LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the Plan's strengths as well as documents areas for future improvement.
- The Multi-Jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

Jurisdiction: El Paso County	**Title of Plan:** Pikes Peak Regional Multi-Hazard Mitigation Plan Update 2020	**Date of Plan:**

Local Point of Contact: Lauren McCoy	**Address:** 3755 Mark Dabling Boulevard Colorado Springs, CO 80907
Title: Emergency Preparedness Planner	
Agency: Office of Emergency Management	
Phone Number: 719-575-8401	**E-Mail:** LaurenMcCoy@elpasoco.com

State Reviewer: Patricia L. Gavelda Mark W. Thompson	**Title:** DHSEM Local Hazard Mitigation Planning Program Manager; Mitigation Planning Specialist	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region VIII		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1: MULTI-JURISDICTION SUMMARY SHEET

MULTI-JURISDICTION SUMMARY SHEET									
#	Jurisdiction Name	Jurisdiction Type	Jurisdiction Contact	Email	Requirements Met (Y/N)				
					A. Planning Process	B. HIRA	C. Mitigation Strategy	D. Update Rqtms.	E. Adoption Resolution
1	Calhan	Statutory Town	Cindy Tompkins	townclerk@calhan.co					
2	Colorado Springs	Home Rule Municipality	Michael Schaub	Michael.Schaub@coloradosprings.gov					
3	El Paso County	County	Lauren McCoy	laurenmccoy@elpasoco.com					
4	Fountain	Home Rule Municipality	Luchia Tingley	ltingley@fountaincolorado.org					
5	Green Mountain Falls	Statutory Town	Angie Sprang	gmftownmanager@gmail.com					
6	Manitou Springs	Home Rule Municipality	Karen Berchtold	kberchtold@comsgov.com					
7	Monument	Statutory Town	Erica Romero	eromero@tomgov.org					
8	Palmer Lake	Statutory Town	Bob Radosevich	bob@palmer-lake.org					
9	Ramah	Statutory Town	Cindy Tompkins	calhanclerk@qwestoffice.net					

SECTION 2: REGULATION CHECKLIST

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** **(section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	**Chapter 2, Section 2.1** lists the jurisdictions participating in the plan and who represented each jurisdiction. **Chapter 2, Section 2.2, Chapter 5, Section 5.1,** and **Appendix B** documents each jurisdictions involvement in the planning process.		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §))	**Chapter 2, Section 2.2** and **Appendix B** documents neighboring community, local and regional agencies, and other stakeholder participation.		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	**Chapter 2, Section 2.2** describes public participation and **Appendix B** documents invites and input received.		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	**Chapter 2, Section 2.2** describes plans, reports, and studies that were incorporated into the plan and **Appendix F** includes a list of references.		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	**Chapter 6, Section 6.5** describes how the jurisdictions will continue to seek public participation after the plan has been approved.		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	**Chapter 6, Sections 6.2, 6.3, 6.4** provide a method and schedule for keeping the plan current, including monitoring, evaluating, and updating.		
ELEMENT A: REQUIRED REVISIONS:			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** **(section and/or page number)**	**Met**	**Not Met**
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Description of type, location, and extent is located within each hazard profile which are found **in Chapter 4, Sections 4.6 through 4.11** **Chapter 4, Section 4.1** provides rationale for omission of natural hazards.		
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	**Chapter 4, Sections 4.6 through 4.11** include information on previous occurrences and probability.		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	**Chapter 4, Sections 4.6 through 4.11** describe the potential impacts of each identified hazard and an overall summary of vulnerability and key issues.		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	**Chapter 4, Section 4.6.1** describes the types and estimates the numbers of RL and SRL properties.		
ELEMENT B: REQUIRED REVISIONS:			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	**Chapter 3, Sections 3.1 and 3.2** documents each jurisdictions' existing authorities, policies, programs and resources and its ability to expand on them.		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	**Chapter 4, Section 4.6.1** addresses each jurisdiction's current participation in the NFIP and **Chapter 5, Section 5.4** discusses continued compliance.		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	**Chapter 5, Section 5.2** include a list of goals and objectives aimed at reducing and avoiding long-term vulnerabilities.		

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** **(section and/or page number)**	**Met**	**Not Met**
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	**Chapter 5, Section 5.3 (Table 5-2)** includes a comprehensive range of mitigation actions for each jurisdiction.		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	**Chapter 5, Section 5.3** describes the criteria used to assign priority rankings and **Chapter 6, Section 6.2** describes how the actions identified will be prioritized, implemented and administered. **Table 5-2** identifies the agency responsible for implementing the action and expected timeframes. **Table 5-1** lists potential sources of funding to implement identified mitigation actions contained within the HMP.		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	**Chapter 6, Section 6.6** outlines how participating jurisdictions will incorporate mitigation goals and actions into other planning mechanisms.		
ELEMENT C: REQUIRED REVISIONS:			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	**Chapter 3, Section 3.1** and **Chapter 4, Sections 4.6 through 4.11** discuss past and future development trends.		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	**Chapter 5, Table 5-2** includes a description of current actions and their status. **Appendix D** lists completed and removed actions.		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Capabilities, hazards, goals, priorities, and actions were re-evaluated and updated to reflect changes since the previous plan update. **Chapters 3, 4, and 5** reflect those changes. **Appendix B** documents input submitted by participating jurisdictions and stakeholders.		

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** **(section and/or page number)**	**Met**	**Not Met**
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	**Appendix E** includes adoption documentation for each jurisdiction.		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Pending completion		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 3: PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Element B: Hazard Identification and Risk Assessment

Element C: Mitigation Strategy

Element D: Plan Review, Evaluation, and Implementation (Plan Updates Only)

B. Resources for Implementing Your Approved Plan

Appendix B - Planning Process Documentation

APPENDIX B: PLANNING PROCESS DOCUMENTATION

Contents:

1. Local Planning Committee (LPC) Invite List
2. Request for information on updated and/or new data, plans, policies, programs, studies, reports and other technical information
3. LPC Kickoff Meeting
    a. Invitation
    b. Sign-in Sheets
    c. Presentation
    d. Input from meeting
    e. Minutes
4. Public Input Survey (Community Assets, Goals, and Actions)
    a. Survey Result Summary
    b. Press Releases
5. LPC HIRA & Mitigation Strategy Meeting
    a. Invitation
    b. Presentation
    c. Input from meeting / List of Attendees
6. Request for partnering jurisdiction input on Region Profile and Capability Matrices
7. Local Municipality Mitigation Action Inputs
8. Neighboring Jurisdiction request for input
9. Public Comments on draft Plan
    a. Press Release & Distribution List
    b. Input

LPC Contact List

Function	El Paso County – Office/Name	EPC POC Email	Colorado Springs – Office/Name	COS POC Email
GIS	Information Technology Department/GIS: Mike Duysen	mikeduysen@elpasoco.com	Information Technology Department/GIS:	bootsy.jones@coloradosprings.gov
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From: Mike Schaub

To: Weinstein, Laura; EXTERNAL Tobi A Blanchard; Mike Duysen; Scot Cuthbertson; Troy Wiitala; Jennifer Irvine; Jim Schanel; Lonnie Inzer; Nora Todd; Lori Cleaton; Lisa Powell; Janel McNair; Ricky Bransford; Brian Olson; Steve Schleiker; Ryan Parsell; cobrien@hsd2.org; morsej@wsd3.org; mromero@ffc8.org; hastijt@d11.org; cooper@cmsd12.org; dgieck@mssd14.org; brian.grady@asd20.org; chrissmith@esd22.org; timkistler@peyton.k12.co.us; gschmidt@hanoverhornets.org; dcoates@lewispalmer.org; dwatson@d49.org; dslothower@calhanschool.org; dmitchell@calhanschool.org; swilson@bigsandy100J.org; pfrank@edison54jt.org; debra.payne@miamiyoder.org; msantos@coloradocollege.edu; Jim.Barrentine@ppcc.edu; EXTERNAL ssmith3; townclerk@calhan.co; gmftownmanager@gmail.com; Ltingley@fountainpd.com; MGates@fountaincolorado.org; jbreister@comsgov.com; kberchtold@comsgov.com; messam@comsgov.com; jshirk@tomgov.org; tthornish@tomgov.org; bob@palmer-lake.org; Donald.moore@state.co.us; irenemerrifield@state.co.us; Mike McHargue - Lake County Emergency Manager (mike.mchargue@state.co.us); thomas-t@mvea.org; corey.koca@blackhillscorp.com; Broomfield, Sally; drouse@ccharitiescc.org; annie_oatman-gardner@bennet.senate.gov; brad.henley@state.co.us; brandon_gould@gardner.senate.gov; msims@mtc-inc.com; robert.hernandez@coloradosprings.gov; DHerring@theindependencecenter.org; David Mejia; jessicadavis@centura.org; kschroeder@springsgov.com; bootsy.jones@coloradosprings.gov; jack.ladley@coloradosprings.gov; aaron.egbert@coloradosprings.gov; makofsbr@ci.colospgs.co.us; kevin.madsen@coloradosprings.gov; jennifer.vance@coloradosprings.gov; "James.Muth@ColoradoSprings.gov"; Ryan.trujillo@coloradosprings.gov; kmelchor@springsgov.com; JReid@springsgov.com; bdorris@comsgov.com; Jason Meyer; Orwig, Lorri; "lvigna@hsppr.org"; Leon Kelly; Matt Reid; Eric Barnett (Eric@ppunitedway.org); Lisa Hatfield; Brian Bobeck; Thomas.Buettner@uchealth.org; French, Brigitte; kris.cooper@coloradosprings.gov; Bartlett, Joshua P.; omartinez@fs.fed.us; "Michael.laughlin@state.co.us"; seneely@fedex.com; james.hannon@usaa.com; Gally - CDPS, Marilyn; "Erin Duran"; Jenkins, Jimmy; Mark Thompson - CDPS; Patricia Gavelda

Cc: Bret Daniels; Aaron Hueser; Johnson, Mark C; Schroeder, Kurt; Biolchini, Timothy; Emily Shuman; Todd Thomas; Michael Gates; Noblitt, Steven M.; "Husted, David S."; Arndt, Connie; Melchor, Kim

Subject: EXTERNAL: Multi-Hazard Mitigation Plan Kickoff Meeting

Date: Wednesday, February 19, 2020 2:34:19 PM

To all:

Just a friendly reminder that our upcoming HMP Kickoff Meeting is scheduled for February 25th from 10 to 11:30 AM. Please confirm your attendance if you haven't done so already… thanks!

In addition, if your agency was one of the ones that filled out our questionnaire, thank you! If you haven't done so, please take the time to fill out a QUICK questionnaire on your jurisdiction's role in risk assessment and mitigation planning and execution. It will help us shape our meeting on the 25th so that we all can benefit from the time together.

Please click here to complete the survey with your updates by February 28th. Note that the survey requires an active gmail account to access.

Thank you for your time and we'll see you next week!

Mike and Tobi

Mike Schaub, Recovery and Mitigation Manager Pikes Peak Regional Office of Emergency Management 3755 Mark Dabling Boulevard Colorado Springs, CO 80907	**Tobi Blanchard, EM Coordinator** Pikes Peak Regional Office of Emergency Management 3755 Mark Dabling Blvd. Colorado Springs, CO 80907 cell: 719-592-0880

Multi-hazard Mitigation Plan Kick Off Meeting

Pikes Peak Regional Office of Emergency Management

February 25, 2020 – 10:00am to 11:30am – Office of Emergency Management; 3755 Mark Dabling Blvd., Colorado Springs, CO 80907

Please join the PPROEM as we kick off our multi-jurisdictional hazard mitigation plan update for El Paso County and the incorporated jurisdictions.

We will establish roles, responsibilities and clear participation standards for all planning team members and adopting jurisdictions in consideration of FEMA requirements; share lessons learned, and best practices related to previous plan developments and updates.

Prior to this meeting we are seeking your assistance to refine the list of recently created data, plans, policies, programs, studies, reports, and other technical information for review and incorporation into the planning process and risk assessment.

Please click here to complete the survey with your updates by February 10th.

This meeting will also include initial conversations on the hazards to be profiled and identify additional critical regional stakeholders.

A calendar invite will follow, please RSVP with your availability. We will also provide a WebEx call in and screenshare option if you cannot attend in person.

For questions, please contact Mike Schaub at MikeSchaub@elpasoco.com or Tobi Blanchard at tobi.blanchard@coloradosprings.gov.

From:	Mike Schaub
To:	Weinstein, Laura; Kuechenmeister, Anne
Subject:	EXTERNAL: FW: PIkes Peak Hazard Mitigation Plan Rewrite - Inputs Requested
Date:	Monday, March 2, 2020 2:06:11 PM
Attachments:	2020-02-25 Kick Off Meeting Survey & Discussion Questions.docx

FYI.

From: Mike Schaub
Sent: Monday, March 2, 2020 2:04 PM
To: townclerk@calhan.co; gmftownmanager@gmail.com; jshirk@tomgov.org; tthornish@tomgov.org; bob@palmer-lake.org; 'shemingway@tomgov.org' <shemingway@tomgov.org>
Cc: EXTERNAL Tobi A Blanchard <tobi.blanchard@coloradosprings.gov>; Lonnie Inzer <LonnieInzer@elpasoco.com>
Subject: PIkes Peak Hazard Mitigation Plan Rewrite - Inputs Requested

To all:

If you are receiving this e-mail it is because your organization/jurisdiction did not participate in our recent (February 25th) Hazard Mitigation Plan kickoff meeting. We'd like to get your inputs to our plan revision; see the attached questionnaire for some of the key inputs we are seeking from your communities.

In addition, I would be more than happy to have a phone discussion with you or a designated staff member on this topic or an office visit.

Thanks, and let me know if you have any questions.

Mike Schaub

Mike Schaub

Recovery and Mitigation Manager
Office of Emergency Management
Pikes Peak Regional Office of Emergency Management
3755 Mark Dabling Boulevard
Colorado Springs, CO 80907
Office: (719) 520-6577
Cell: (719) 203-0555
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mikeschaub@elpasoco.com

PIKES PEAK REGIONAL EMERGENCY MANAGEMENT	February 25, 2020 1000-1130	Hazard Mitigation Plan Update	
Name	**Agency**	**E-mail Address**	**Initial**
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PIKES PEAK REGIONAL EMERGENCY MANAGEMENT	February 25, 2020 1000-1130	Hazard Mitigation Plan Update	
Name	**Agency**	**E-mail Address**	**Initial**
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Sprang, Angie	Green Mountain Falls		

PIKES PEAK REGIONAL EMERGENCY MANAGEMENT	February 25, 2020 1000-1130	Hazard Mitigation Plan Update	
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Berchtold, Karen	Manitou Springs	k you've got it	KB
Bartlett, Josh	CSFD	on file	JB
Reid, Jim	PPROEM	on fil	JR

PIKES PEAK REGIONAL EMERGENCY MANAGEMENT	February 25, 2020 1000-1130	Hazard Mitigation Plan Update	
Name	**Agency**	**E-mail Address**	**Initial**
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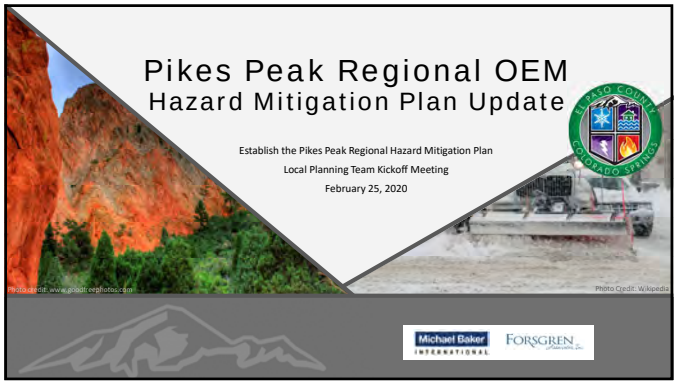


1

Meeting Goals

1. Understand the process and uses of a hazard mitigation plan.
2. Understand your role.
3. Contribute to the collective understanding of your community, hazards and impacts.

2

Pikes Peak Regional HMP: Kickoff Agenda

1. Introductions/Roles & Responsibilities
2. Hazard Mitigation Plan Background
3. Planning Team Support
4. The Planning Process
5. Hazard & Gap Identification
6. Schedule & Next Steps

3

Introductions/Roles & Responsibilities

El Paso County- PPROEM HMP Team
- Mike Schaub
- Lonnie Inzer

City of Colorado Springs – PPROEM HMP Team
- Tobi Blanchard
- Kevin Madsen

Jurisdictions included in HMP update

4

What jurisdiction are you representing?

Start the presentation to see live content. Still no live content? Install the app or get help at PollEv.com/app

5

Did you participate in the 2016 Colorado Springs and/or 2015 El Paso County HMP planning process?

Yes

No

Unsure

6

Hazard Mitigation Plan Background

- What is Hazard Mitigation?
  - Aims to reduce the likelihood that a hazard will result in a disaster.
- What is a Hazard Mitigation Plan?
- Why Develop and Adopt a HMP?
- How often is it updated

7

Hazard Mitigation Plan Background

- What is Hazard Mitigation?
- What is a Hazard Mitigation Plan?
  - Assess current and possible future risk and community capabilities.
  - Assign and prioritize mitigation strategies to address vulnerabilities.
- Why Develop and Adopt a HMP?
- How often is it updated?

8

Hazard Mitigation Plan Background

- What is Hazard Mitigation?
- What is a Hazard Mitigation Plan?
- Why Develop and Adopt a HMP?
  - Key to breaking the cycle of disaster damage, reconstruction, and repeated damage.
  - Ensures jurisdictions remain eligible to receive funding for mitigation projects and post-disaster assistance.
  - Guides and assists community decision makers as they move forward with mitigation and resilience actions.
- How often is it updated?

9

Hazard Mitigation Plan Background

- What is Hazard Mitigation?
- What is a Hazard Mitigation Plan?
- Why Develop and Adopt a HMP?
- How often is it updated?
  - Required every 5 years.
  - Strategy progress updated annually.

10

Planning Team Coordination

- Input and Guidance
  - Hazard identification and prioritization
  - Knowledge of existing needs, ongoing projects, and available resources
  - Identify potential mitigation projects/actions
  - Review and comment on draft plan
- Process support
  - Coordinate and assist with public involvement
  - Plan adoption

El Paso County 2015 HMP Update Steering Committee Meeting

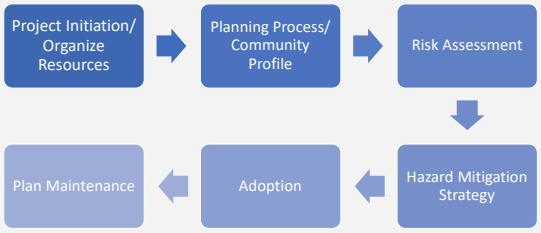
11

Regionalized Planning Process

- Project Overview
  - Regionalized plans
  - Build on existing content/successes
  - Current plan(s) form the backbone for this update

12

Overview of Plan Development Process



13

Overview of Plan Development Process

- Establish project goals
- Determine format/content
- Collect data
  - GIS datasets
  - Plans, policies, documents, and relevant materials for hazard mitigation planning
  - Please complete the survey by 02/28/2020
- Identify stakeholders

14

Overview of Plan Development Process

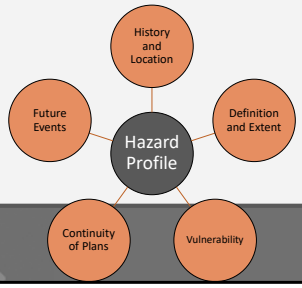
Planning Process
- Convene Planning Team kickoff meeting
- Conduct community outreach

Community Profile
- Historical Overview
- Geography
- Demographics
- Land Use
- Disaster Declarations
- And many more

15

Overview of Plan Development Process

- Determines overall threat to community
- Hazard Identification and Risk Assessment (HIRA)



16

Overview of Plan Development Process

Capability
- Inventory of planning/regulatory tools, resources, organizational capacity, and ability to implement

Strategy
- Review past actions and update Strategy based on this review, the Community Profile, Risk Assessment, and Capability assessment

Action
- Prioritize measures, include implementation details

Future steps taken to reduce potential vulnerabilities

17

Overview of Plan Development Process

- Adoption by all participating jurisdictions
- State and FEMA approval

18

Overview of Plan Development Process

- Annual review to update progress

19

Hazard identification

- 5 natural hazard categories and 5 human-caused hazard categories considered for HMP update
- Hazard identification
  - Prior planning efforts
  - New emerging threats

20

Identified Hazards

A. Flood (Dam/Levee Failure, Mud or Debris Flow)
B. Severe Weather (Hail, Drought, Lightning, Tornado, Wind)
C. Winter Storm (Avalanche, Blizzard, Snow Accumulation)
D. Geologic (Earthquake, Subsidence & Sinkholes, Landfall/Rockfall)
E. Wildfire
F. Hazardous Materials (Fixed Facility, Transportation)
G. Terrorism
H. Cyber Attack
I. Pandemic/Epidemic
J. Major Transportation Incident (Air, Rail, Motor Vehicle)

21

The Pikes Peak Region should focus hazard Mitigation efforts on which top hazard? Choose top five for Pikes Peak region.

Flood
Severe Weather
Winter Storm
Geologic
Wildfire

22

The Pikes Peak Region should focus hazard Mitigation efforts on which top hazard? Choose top five for your jurisdiction.

Flood
Severe Weather
Winter Storm
Geologic
Wildfire

23

Prioritization Discussion

Are there other hazards that have not been discussed that you feel pose a significant threat?

Hazards Profiled:
A. Flood (Dam/Levee Failure, Mud or Debris Flow)
B. Severe Weather (Hail, Drought, Lightning, Tornado, Wind)
C. Winter Storm (Avalanche, Blizzard, Snow Accumulation)
D. Geologic (Earthquake, Subsidence & Sinkholes, Landfall/Rockfall)
E. Wildfire
F. Hazardous Materials (Fixed Facility, Transportation)
G. Terrorism
H. Cyber Attack
I. Pandemic/Epidemic
J. Major Transportation Incident (Air, Rail, Motor Vehicle)

24

Community Profile Discussion

How community changes intersect with hazard mitigation strategy and needs.

25

In the past 5 years has your jurisdiction been impacted by:

Development in hazard prone areas	A
A high potential for more growth in hazard prone areas	B
Life and property in burns scars	C
Infrastructure vulnerability has increased (i.e. now in a floodplain)	D
Reduced capacity to respond to hazards	E
Community development patterns with inadequate access for evacuation	F
Other	G

26

Community Profile Discussion

Have you seen any major changes in your jurisdiction that should be considered in this plan update? Discuss.

27

What type of mitigation activities have been the most impactful from your perspective?

Planning / Regulation	A
Structure/infrastructure	B
Natural Systems Protection	C
Outreach / Education	D
Other	E

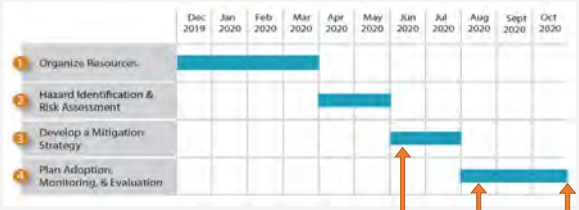
28

Mitigation Activities Discussion

- What has made mitigation implementation successful in your jurisdiction (share local best practices)?
- Where have you encountered setbacks and challenges and what resources would help you overcome these?

29

Schedule



June 2020
HIRA Results & Mitigation Strategy Planning Team Workshop

August 2020
Public Open House & Public Draft Plan

October 31st
Adoption

30

Next Steps

- Drop by the Public Open House on August 5, 6-7:30.
- Develop ideas for how to involve the general public in the planning process.
- Brainstorm potential mitigation actions for the next meeting.
- Be on the look out for website information.

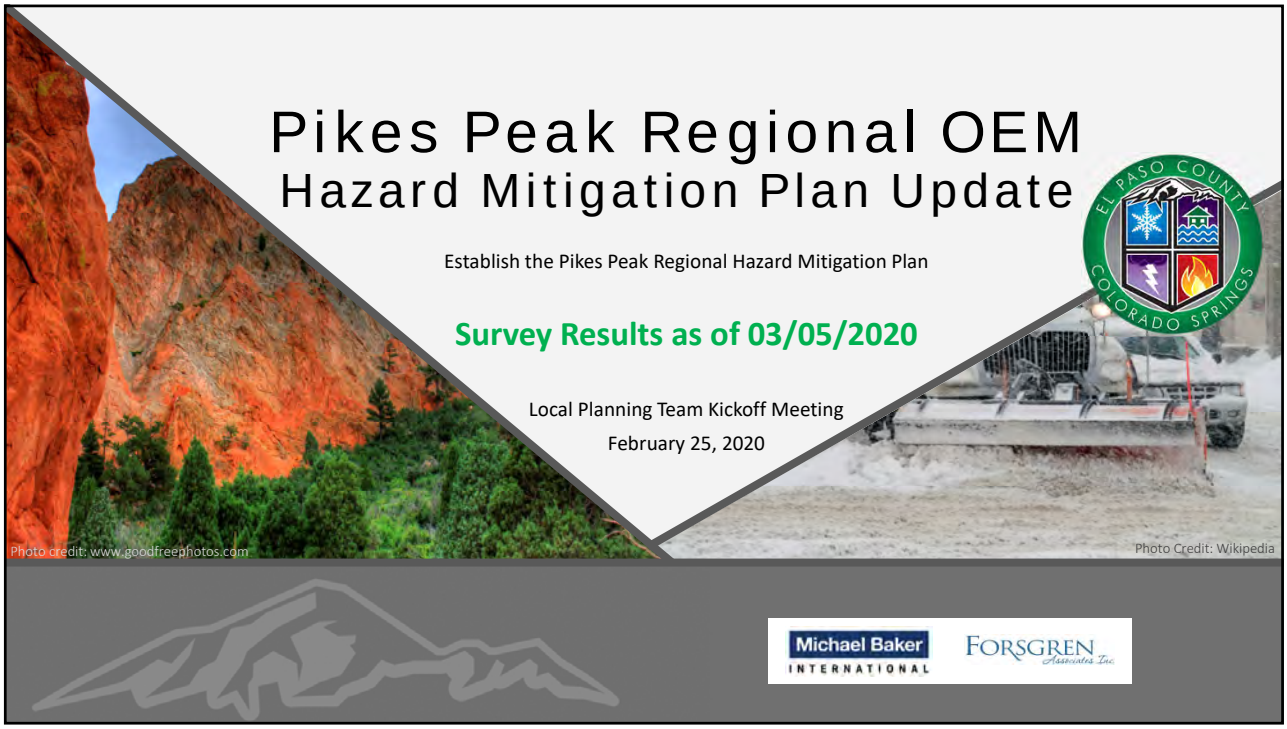
31

Pikes Peak Regional OEM Hazard Mitigation Plan

Local Planning Team Kickoff Meeting

February 25, 2020

32



1

Identified Hazards

A. Flood (Dam/Levee Failure, Mud or Debris Flow)
B. Severe Weather (Hail, Drought, Lightning, Tornado, Wind)
C. Winter Storm (Avalanche, Blizzard, Snow Accumulation)
D. Geologic (Earthquake, Subsidence & Sinkholes, Landfall/Rockfall)
E. Wildfire
F. Hazardous Materials (Fixed Facility, Transportation)
G. Terrorism
H. Cyber Attack
I. Pandemic/Epidemic
J. Major Transportation Incident (Air, Rail, Motor Vehicle)

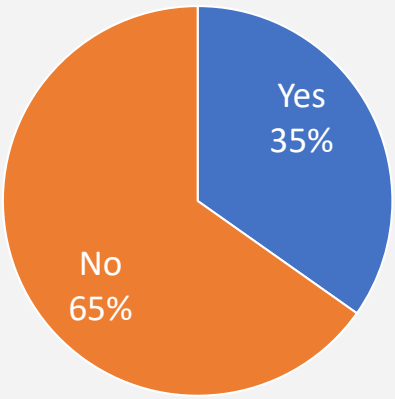
2

Who Participated in the Survey?

El Paso County Sheriff Wildland Fire Management	El Paso County Public Works
Pikes Peak Community College	Colorado Springs Utilities
City of Colorado Springs	Pikes Peak Community College
Children's Hospital Colorado	City of Colorado Springs Fire Department
SCR VOAD	Penrose – St. Francis
El Paso County/Pikes Peak Regional OEM	UC Health
Manitou Springs	Red Cross
City of CO Springs Planning Department	City of Fountain

3

Did you participate in the 2016 Colorado Springs and/or 2015 El Paso County HMP planning process?



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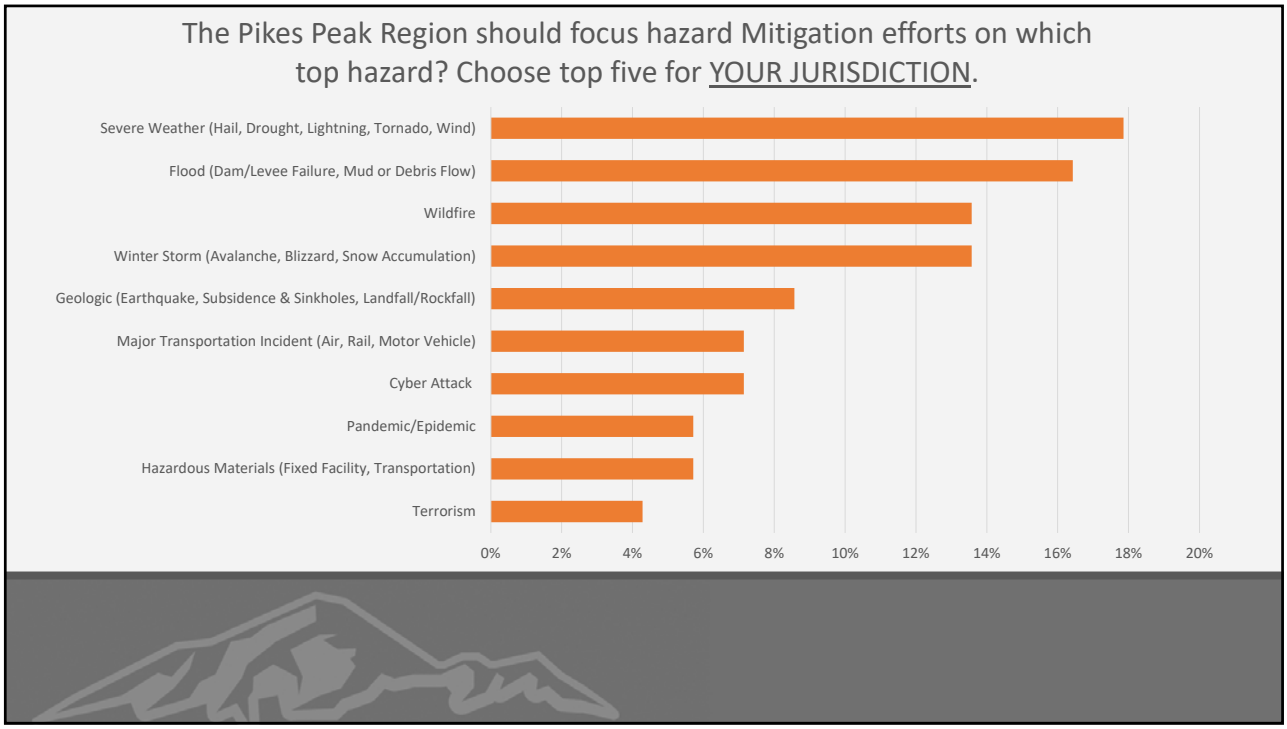
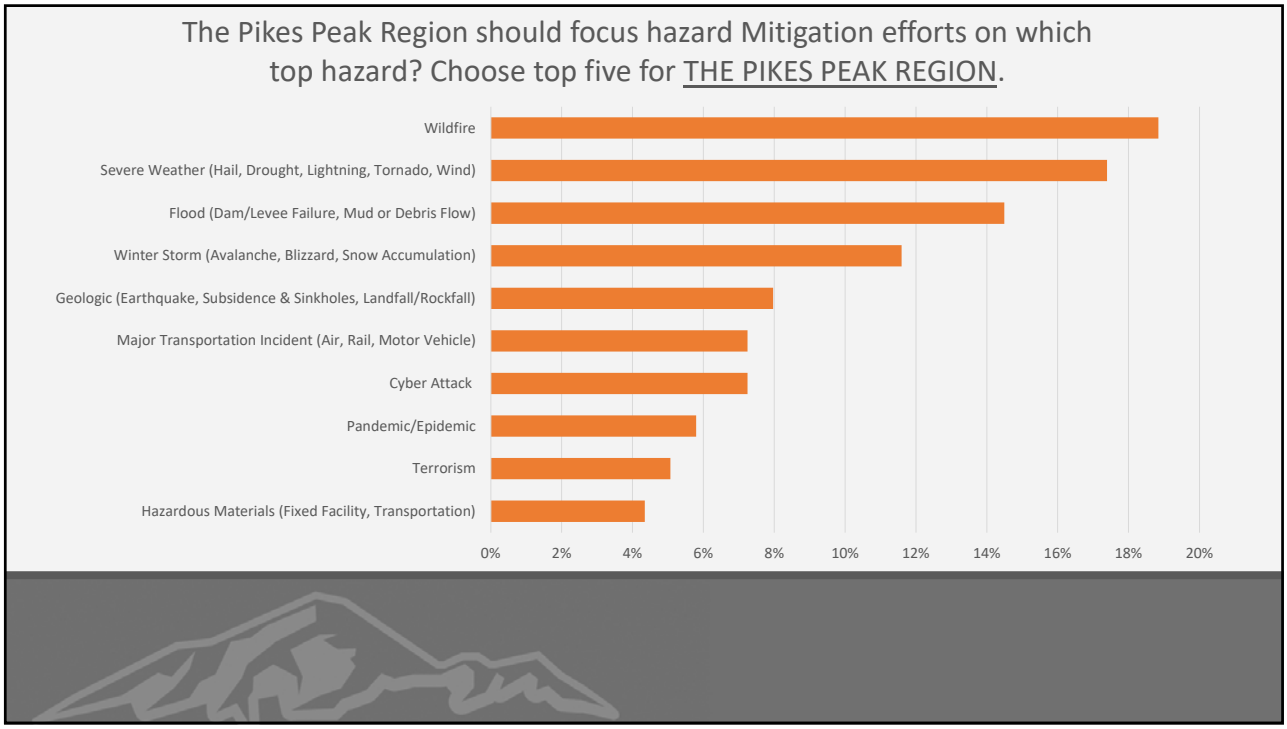
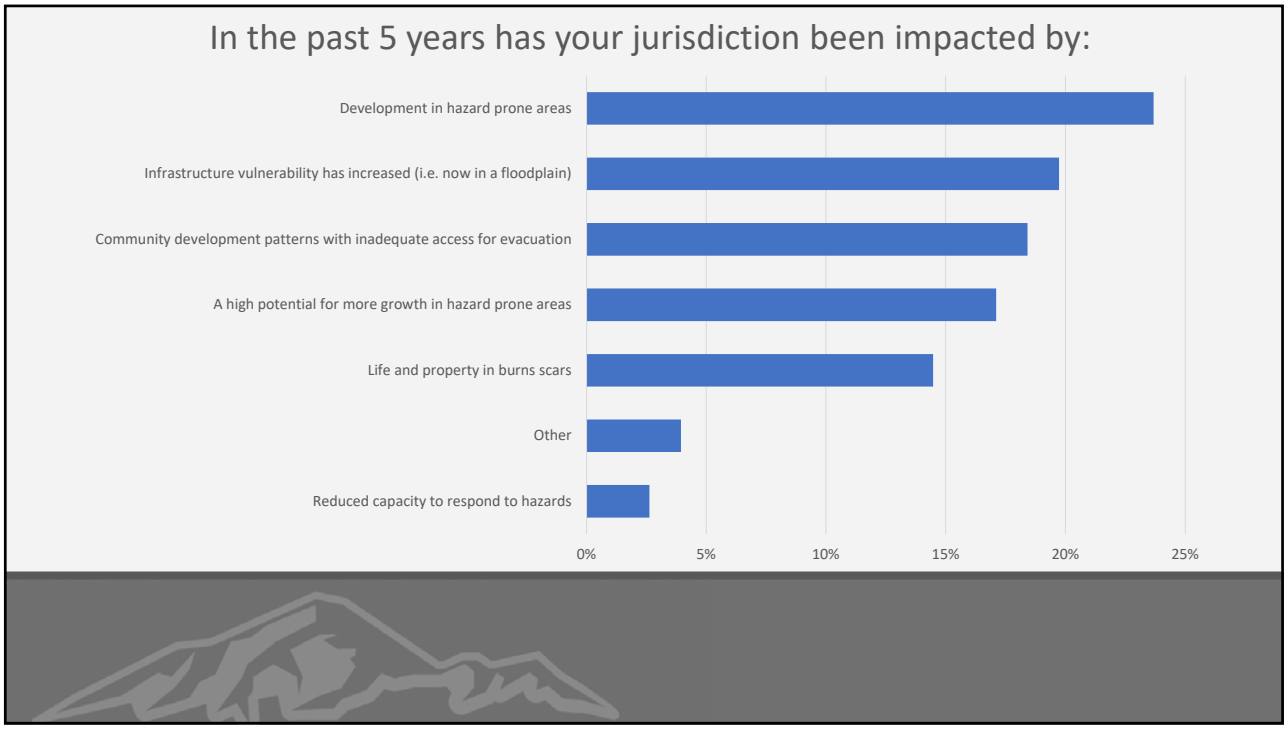

The Pikes Peak Region should focus hazard Mitigation efforts on which top hazard? Choose top five for YOUR JURISDICTION.
Severe Weather (Hail, Drought, Lightning, Tornado, Wind)
Flood (Dam/Levee Failure, Mud or Debris Flow)
Wildfire
Winter Storm (Avalanche, Blizzard, Snow Accumulation)
Geologic (Earthquake, Subsidence & Sinkholes, Landfall/Rockfall)
Major Transportation Incident (Air, Rail, Motor Vehicle)
Cyber Attack
Pandemic/Epidemic
Hazardous Materials (Fixed Facility, Transportation)
Terrorism
0%
2%
4%
6%
8%
10%
12%
14%
16%
18%
20%

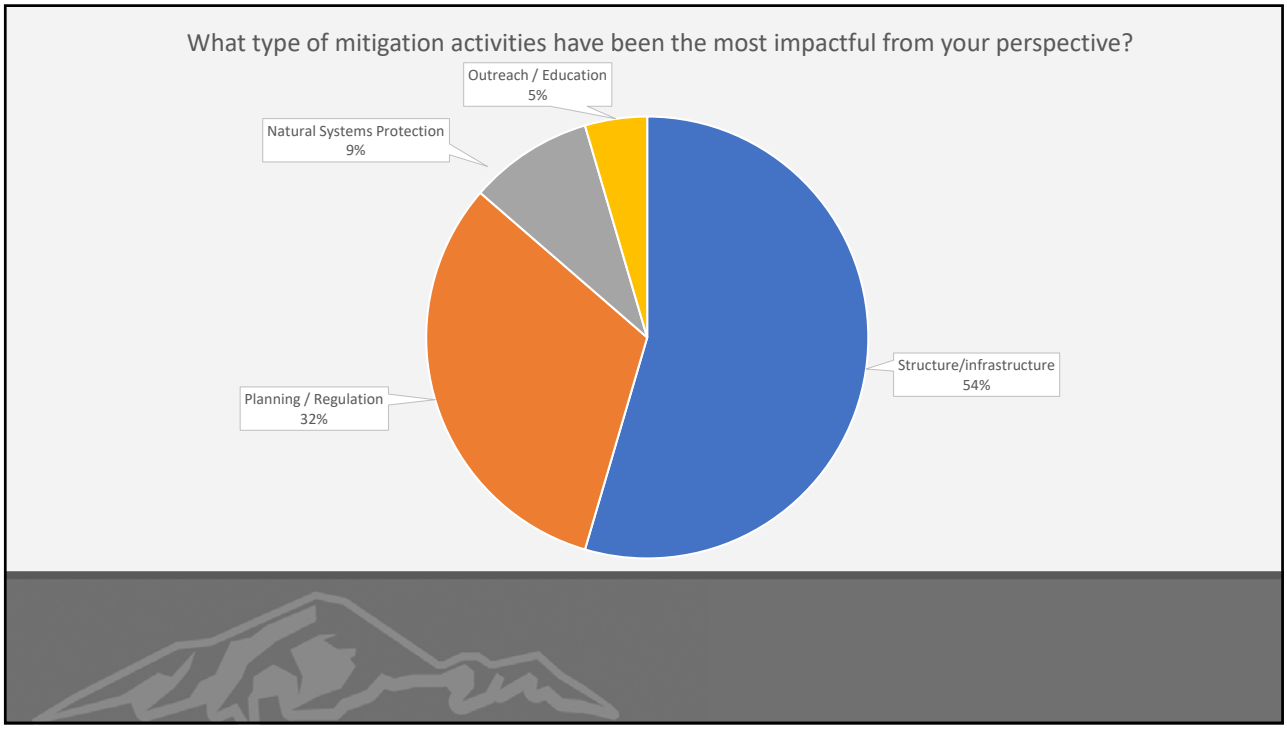
5


The Pikes Peak Region should focus hazard Mitigation efforts on which top hazard? Choose top five for THE PIKES PEAK REGION.
Wildfire
Severe Weather (Hail, Drought, Lightning, Tornado, Wind)
Flood (Dam/Levee Failure, Mud or Debris Flow)
Winter Storm (Avalanche, Blizzard, Snow Accumulation)
Geologic (Earthquake, Subsidence & Sinkholes, Landfall/Rockfall)
Major Transportation Incident (Air, Rail, Motor Vehicle)
Cyber Attack
Pandemic/Epidemic
Terrorism
Hazardous Materials (Fixed Facility, Transportation)
0%
2%
4%
6%
8%
10%
12%
14%
16%
18%
20%

6


In the past 5 years has your jurisdiction been impacted by:
Development in hazard prone areas
Infrastructure vulnerability has increased (i.e. now in a floodplain)
Community development patterns with inadequate access for evacuation
A high potential for more growth in hazard prone areas
Life and property in burns scars
Other
Reduced capacity to respond to hazards
0%
5%
10%
15%
20%
25%

7


What type of mitigation activities have been the most impactful from your perspective?
Outreach / Education 5%
Natural Systems Protection 9%
Structure/infrastructure 54%
Planning / Regulation 32%

8

PROJECT:	El Paso County Hazard Mitigation Plan
PURPOSE:	Planning Team Kickoff Meeting
DATE/TIME HELD:	February 25, 2020, 10:00am-11:30am
LOCATION:	3755 Mark Dabling Blvd, Colorado Springs, CO
INVITED:	Planning Team

Meeting Minutes

Mark Thompson provided an introductory presentation.

A representative from the City of Fountain asked the project team if we will be sitting down with each entity to discuss specific needs? M. Thompson responded by saying, the state will not be meeting with entities, but local MBI and OEM team will. How will that happen? TBD.

Following M. Thompson's introduction, Mike Schaub presented the slides prepared by PPROEM & MBI.

During his presentation, M. Schaub directed a few questions to the audience. He asked: "what does hazard mitigation mean to you?" A respondent from the crowd stated: "culverts". M. Schaub then went on to ask, "what's driving hazard mitigation"? The response from the audience was "money".

M. Schaub posed the question: "why adopt a hazard mitigation plan?" He responded to his own question by stating: "it is one of first initiatives that we have to break out of disaster cycle."

A member of the audience asked the question: "is adoption done in FEMA compliance office?" The answer provided was as follows: "No, Region 8 reviews the plan, then it is sent to FEMA. FEMA gives conditional approval until jurisdictions formally adopt."

M. Thompson brought up the point that the City has received a lot of project grants, often for slope stabilization, where does that fit into the profiled hazard list? He asked the represented jurisdictions to try to figure out what they want to mitigate and how it fits into list.

A member of the audience asked, "where will mining be included?" Mining would fit into one of the natural disaster hazard categories.

The following are hazards, not indicated by PPROEM, that participants brought up as potential risks in the region or within a specific jurisdiction:

- Flash flooding was suggested as a subcategory of flood.
- The representative from Manitou Springs, Karen, indicated hail and erosion as major risks.
- Karen then when on to describe concern among citizens about food systems. There are a lot of local and regional farms. What do we do if there are pressure on food supplies? What threats are on food systems? The major threats include climate change and drought.
- Agri-terrorism was also mentioned as a potential risk to food sources, as was the fault lines and its potential disruption to food systems east to west.

The project team asked participants the question: "what has your jurisdiction been impacted by in last 5 years? The responses provided are as follows:

- Kurt with the Parks Department stated that regional parks are impacted by large wind events. It takes significant staff resources to respond and get back and running. Is frequency increasing? There were 2 or 3 big events in the last few years. Wind or heavy snows have major impact.
- Impacts due to a lack of maintenance – it's not necessarily that infrastructure is eroding but, for example, there is a lack of maintenance of water channels.
- PFOSS issue were raised. It's impacting south end of Colorado Springs. It's estimated that it's raising cost of construction by 20 or 30%.
- Tourism patterns and how it impacts shelters, critical facilities was brought up as cause for concern. Cannabis has changed culture of tourism. Fire caused by tourist given as an example.
- Capability of mitigation and capacity to mitigate with own staff and resources is not adequate. Not keeping up with population, growth, and infrastructure. Immediately ask outside organizations to come help. Need more infrastructure and training to cope and maintain safety of community. Capacity must be adequately planned for future demands.
- A member of the audience asked the project team if we'd be considering potential impacts in that might affect the Pikes Peak Region in the next few years. They were specifically referencing the Emerald Ash Borer and the loss of trees.

The project team asked participants the questions: "what type of mitigation activities have been most impactful from your perspective? What has worked well / what setbacks and challenges?" The responses provided are as follows:

- M. Thompson indicated that from the state's perspective the fact that CSU belongs to State, partnership already in place to help maintain. Publicly owned utilities.
- Funding we get through FEMA has had a huge impact on what we do. Can advance project with a grant, has huge impacts on future risk. How have you been successful in getting funds? Apply every year for as many grants as possible. Look early for grants. Proactive coordination.
- When dealing with smaller entities, run into different issues. Must have someone who will buy in, prioritize, and push to ensure it happens. Like herding cats. Difficult for smaller communities, don't have resources like larger entities.

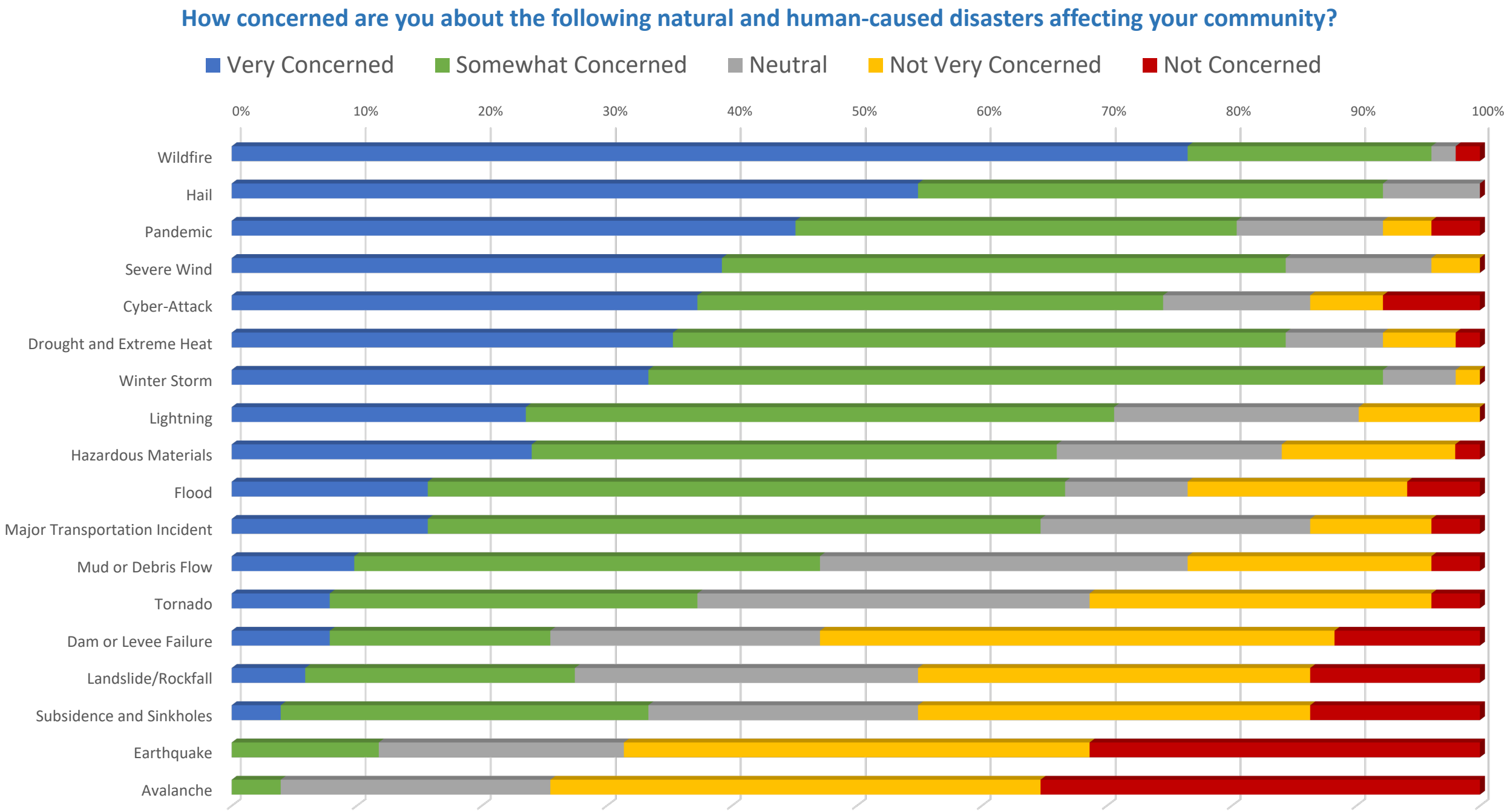
Results Summary

Public Input Survey: Community Assets, Goals, & Actions

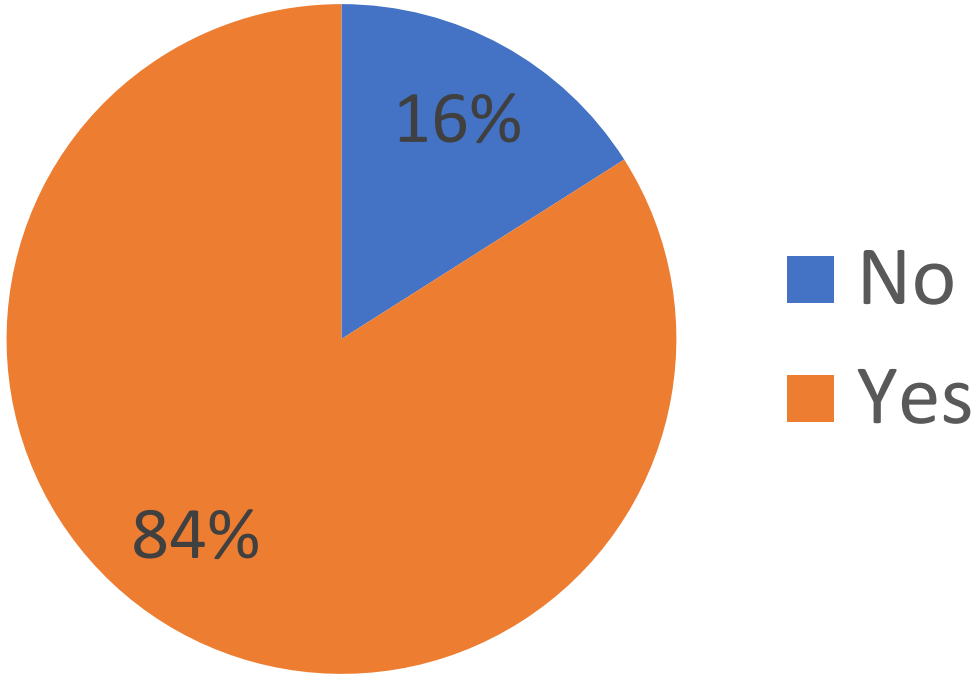
52 respondents

WHAT JURISDICTION DO YOU RESIDE IN?

Jurisdiction	Count
Colorado Springs	28
Unincorporated El Paso County	14
Monument	3
Manitou Springs	3
Fountain	2
School District 11	1
Fremont County	1
Total	52

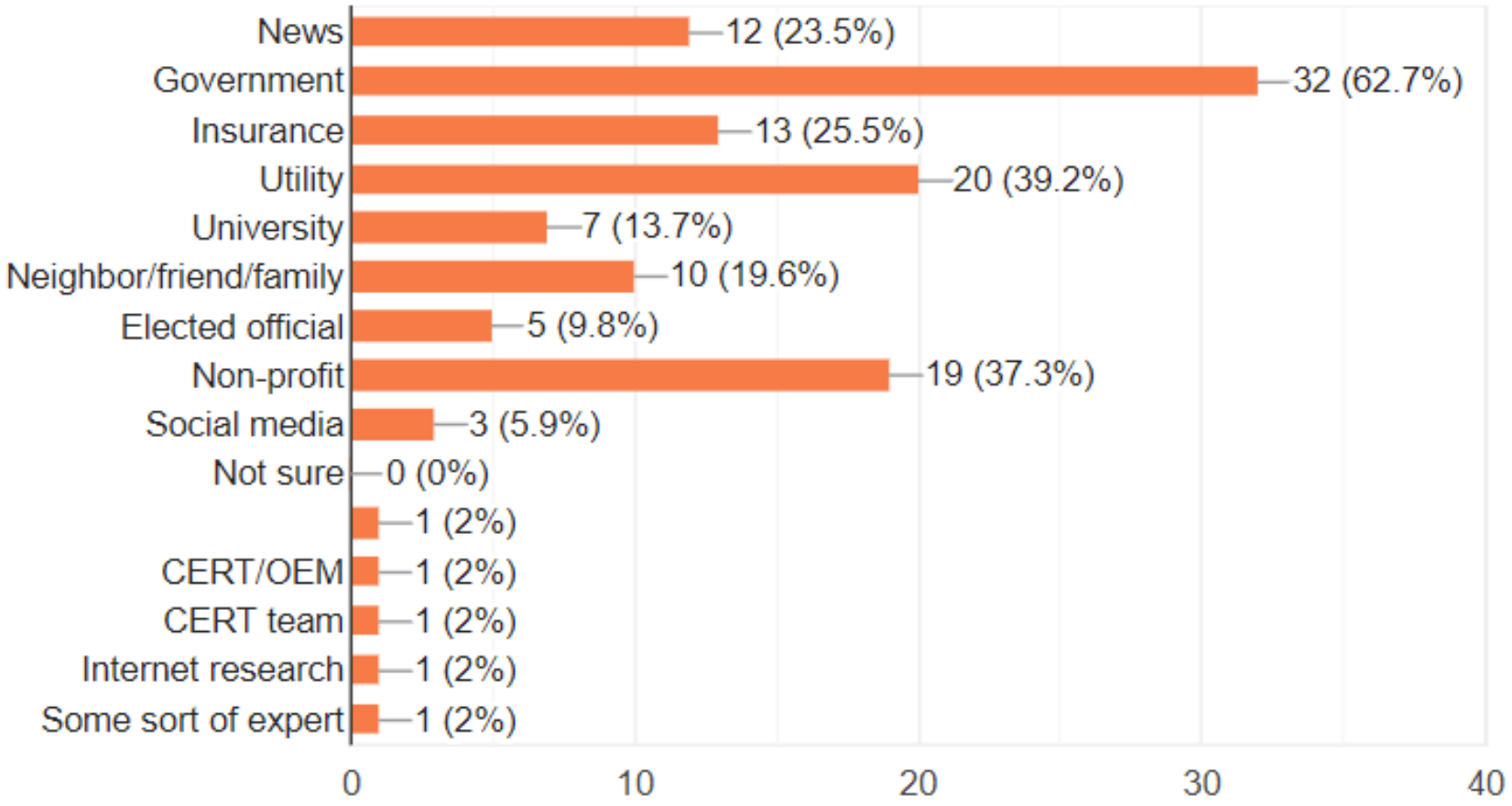

How concerned are you about the following natural and human-caused disasters affecting your community?
Very Concerned
Somewhat Concerned
Neutral
Not Very Concerned
Not Concerned
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Wildfire
Hail
Pandemic
Severe Wind
Cyber-Attack
Drought and Extreme Heat
Winter Storm
Lightning
Hazardous Materials
Flood
Major Transportation Incident
Mud or Debris Flow
Tornado
Dam or Levee Failure
Landslide/Rockfall
Subsidence and Sinkholes
Earthquake
Avalanche

Have you ever received information about how to make your household and your home safer from a natural disaster? If yes, how have you received the information?



How Information Was Received	Percentage
Local government meetings/workshops	30.2%
Local News	16.3%
Email newsletter or listserv	9.3%
Radio	7.0%
CERT	4.7%
Neighbor/family/friend	4.7%
Non-profit organization meetings/workshops	4.7%
Social Media	4.7%
Booth at community events	2.3%
CERT training	2.3%
Firewise inspection from local fire department	2.3%
Mailers	2.3%
mobile weather alerts from department of defense	2.3%
NextDoor	2.3%
Pike Peak Regional Office of Emergency Management	2.3%
Searched about it	2.3%

Whom would you most trust to provide you with information about how to make your household and home safer from disasters? (please select up to 3)



What is the most effective way for you to receive information about how to make your household and home safer from natural disasters? (Please select up to three)

Preferred Method of Information	Percentage
News	28%
Social media	14%
Utility	13%
Government	11%
Neighbor/friend/family	10%
Non-profit	10%
Insurance	8%
Elected official	3%
Internet search	2%
CERT team	1%
OEM	1%
Public Health	1%

In your opinion, which of the following categories are most susceptible to the impacts of natural or human-caused hazards in your community? Please rank the following community asset in order of vulnerability, 1 being the most vulnerable and 6 being the least vulnerable.

Categories

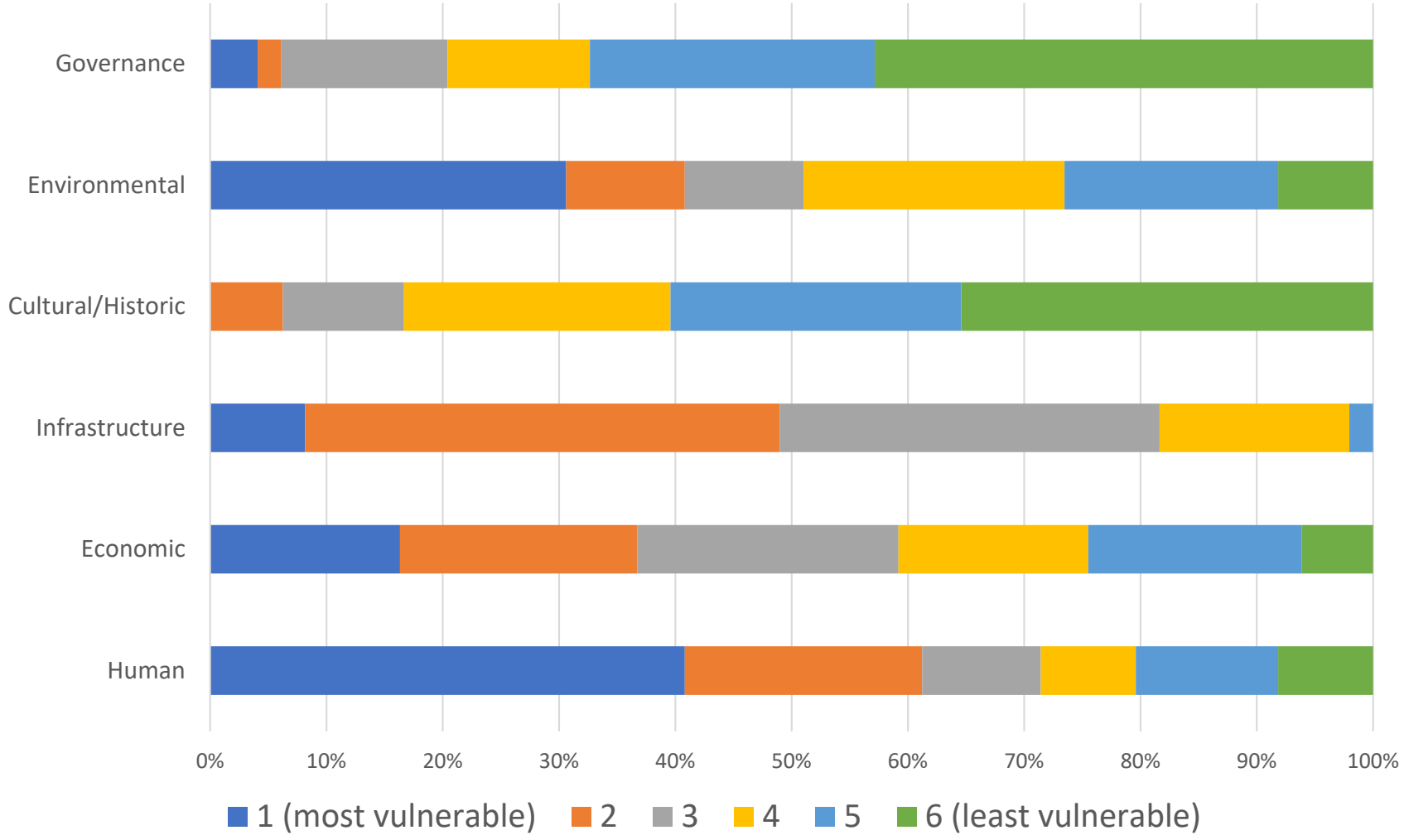
Human: (loss of life and/or other injuries) Economic (tourism, business closures and/or job loss)

Infrastructure: (damage to or loss of bridges, utilities, schools, etc.)

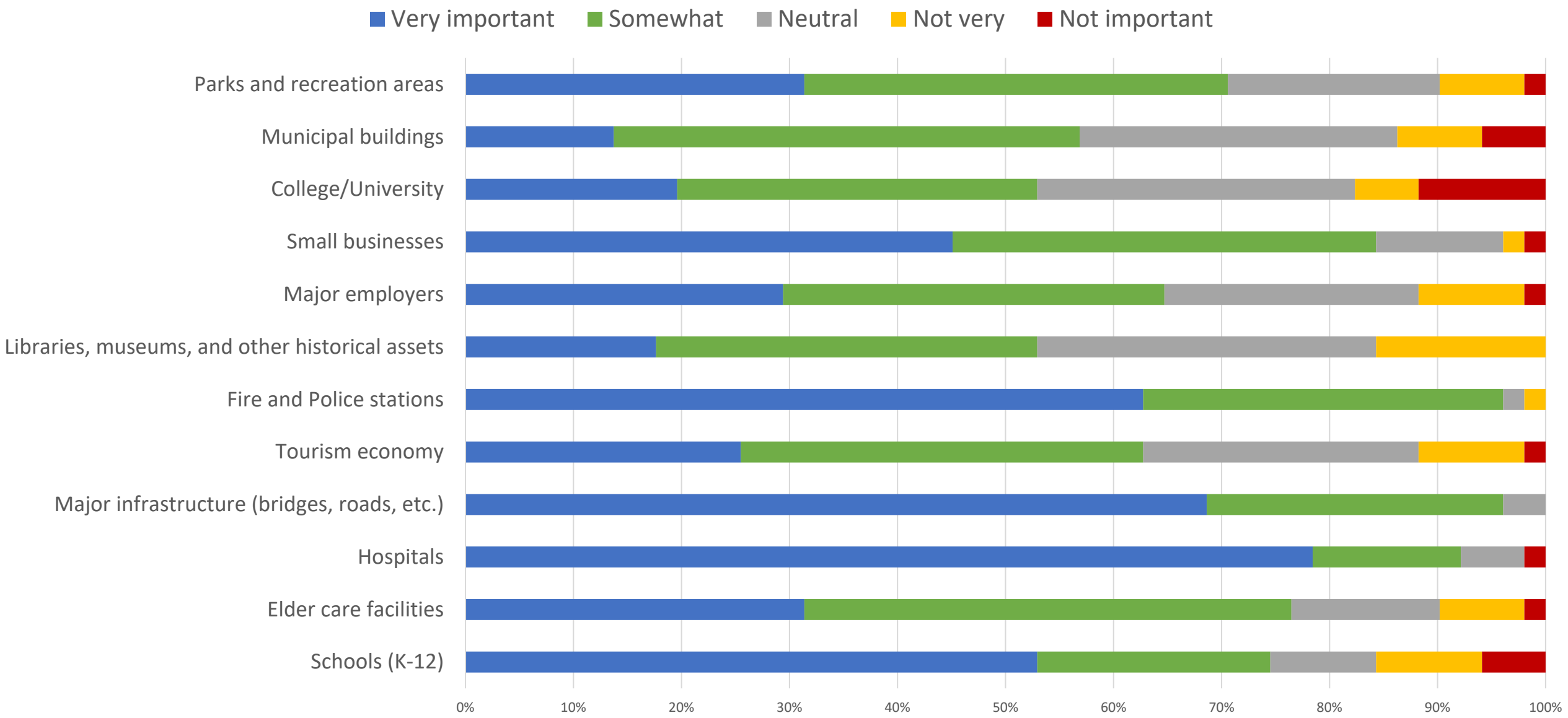
Cultural/Historic: (damage to or loss of libraries, museums, historic buildings or areas, etc.)

Environmental: (damage to or loss of forests, rangeland, waterways, etc.)

Governance: (ability to maintain order and/or provide public services)



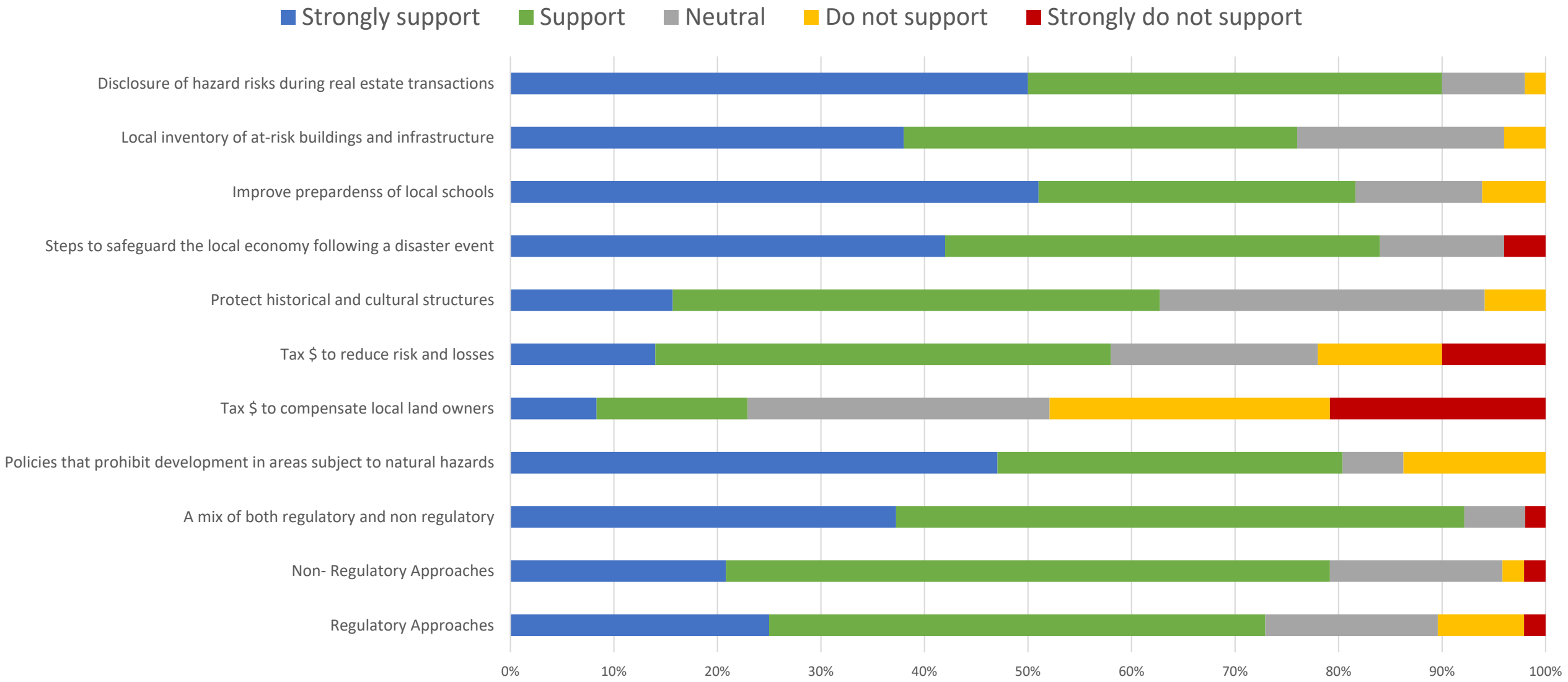
Rank the following specific types of community assets by how important they are to you.



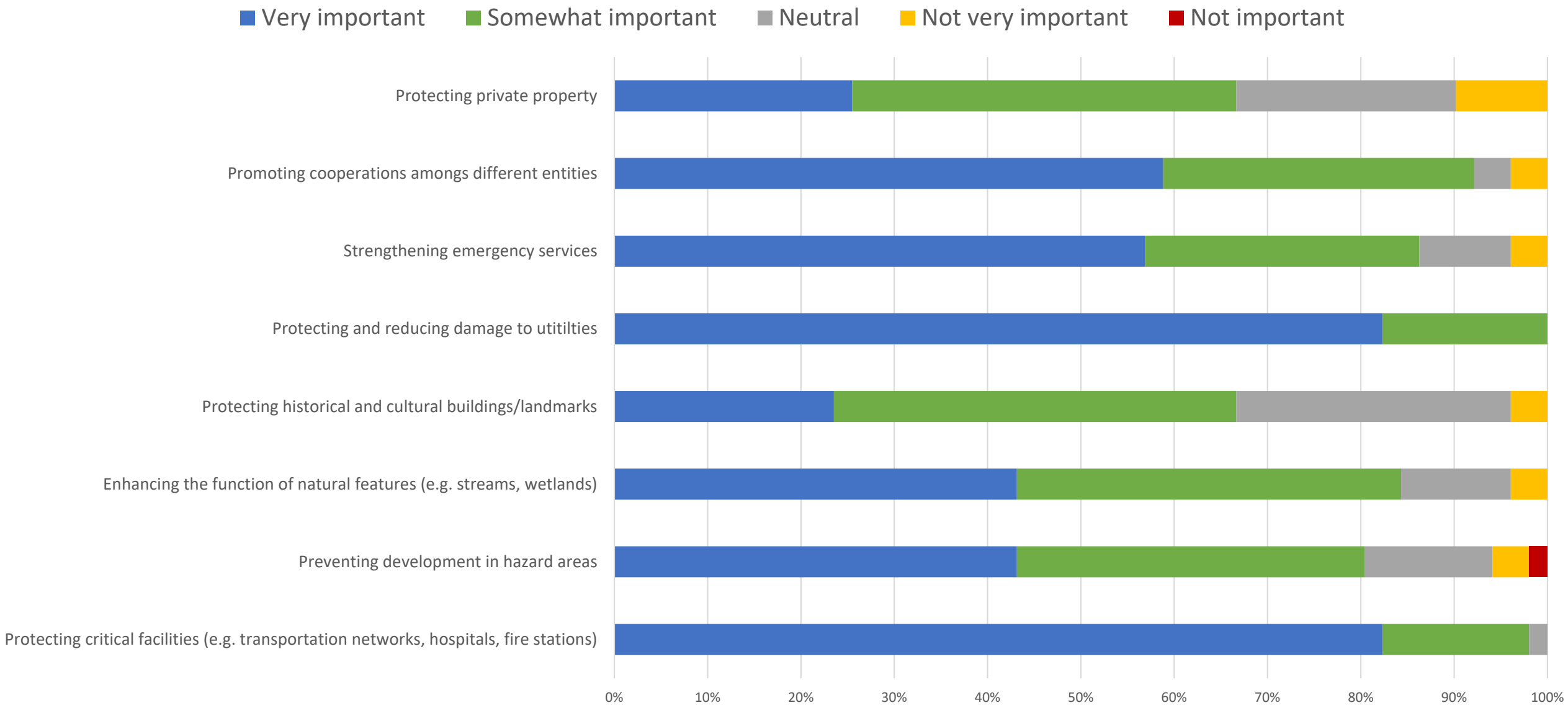
Please list any other assets you feel are most important to your community.

- Internet and Phone Connectivity
- Watersheds and water
- Public works and Utilities
- Religious Orgs & Churches
- All Parks, Ponds, Lakes and Wildlife
- Communication Resources
- Local non-profits, such as EPCSAR, RMFI, TOSC, and Medicine Wheel
- Open Space
- Undisturbed Natural Areas
- Small Community Services – Restaurants etc.,
- Helpful Neighbors and Goodwill across Region,
- Farmers, Ranchers, Grocery stores, and Gas Stations
- Environmental Conservation Areas
- Good Housing Market
- Transportation by Bicycle

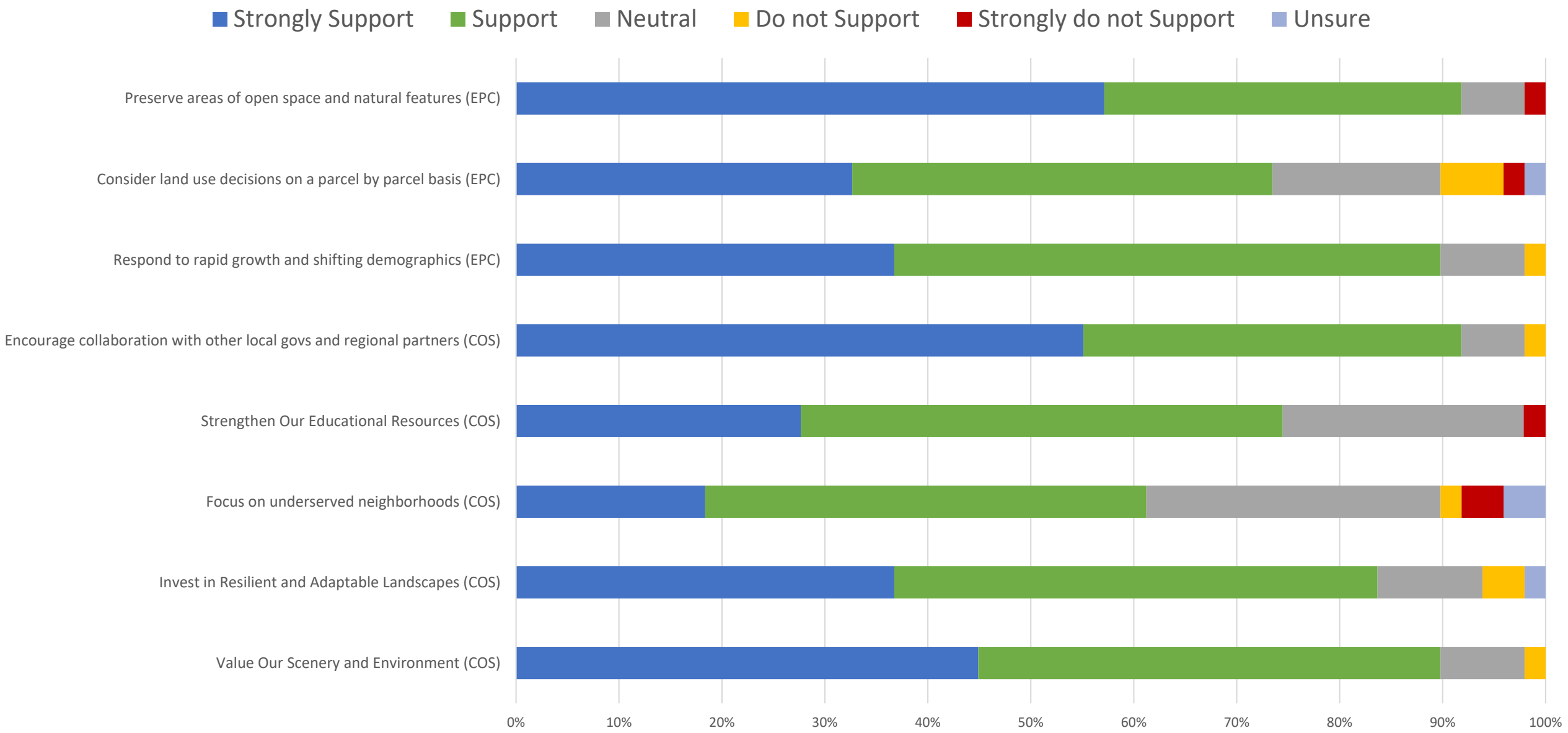
A number of activities can reduce your community's risk from hazards. Please mark the circle that best represents your opinion of the following actions to reduce the risk and loss associated with hazards and natural disasters.



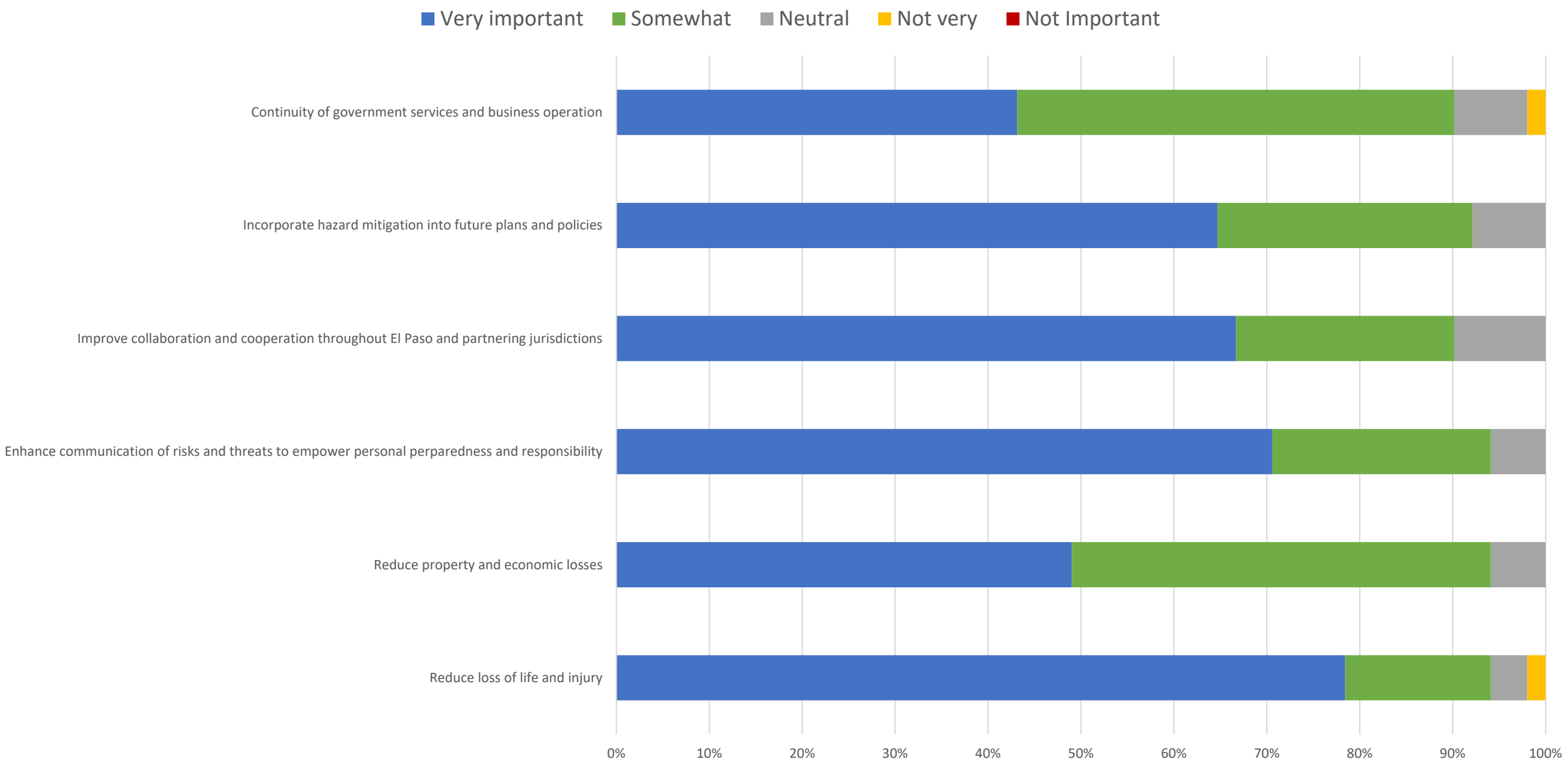
Natural and human-caused hazards can have a significant impact on a community, but planning for these events can help lessen the impacts. To understand citizen priorities regarding planning for hazards, please tell us how important each one of the following is to you.



To help us better align the hazard mitigation plan with the current Colorado Springs Comprehensive plan and the draft El Paso County Master Plan, the updated goals should...



Rank the following goals by how useful you feel they are for guiding community mitigation actions.



Do you have any other thoughts about goals?

- Tailor goals towards the hazards that are real and not politically motivated.
- Need to tell private property owners how much responsibility they have in fire mitigation work.
- hard to do when considering so many different types of disasters in the same survey
- A main goal should be to protect our natural landscapes by implementing plans that allow humans to use and enjoy them, but making sure said use is done in a scientific and ethical way.
- It is very challenging to rank these because I think they are all important and need be pursued so they work together. Some support others.
- Quadruple CERT training and visibility at ALL community events and meetings
- the community needs to understand the risks at their own residence
- Specific plans and preparations for supporting neighboring communities.
- Stop the over development of El Paso, that will help mitigate tons of hazards. The infrastructure here sucks, the roads are a big hazard and more people are being squeezed into tiny spaces, that alone is hazardous. Again, STOP the over development, enough is enough
- Please stop all the coronavirus nonsense. quarantine the at risk population and let the rest of us get back to work. Stop calling it a pandemic and stop violating our rights.
- Influence the individual person or family to reduce their dependency and increase their preparedness.
- Ensure they're SMART goals (Specific, Measurable, Attainable, Realistic, Timely)
- We should be more proactive and preventative rather than just reactive.
- The need for EDUCATING the public about what hazards HAVE HAPPENED (I like the calendar you used to have with events on certain dates). Also more active AND VISIBLE participation of OEM in the County's land use Decision processes.

If you have other thoughts or ideas for mitigation actions, please share them with us in the space below.

- Initial Attack Air Resources for the Region. Rapid response to wildfire can prevent catastrophic loss of property, environmental assets, and economy. Investment must be made to obtain quick initial attack resources especially helicopters with water buckets. They must be readily available year round to respond quickly within the local region.
- Involve the whole community, develop more internships within the OEM for College Students enrolled in the Homeland Security and Emergency Management Degree Program. Offer more CERT classes in Colorado Springs and better advertise for involvement
- unified public campaign from multiple leaders in government and OEM to get people to plan ahead for emergencies (CERT type message but get more leaders saying it out loud)
- make private property owners understand their responsibility for wildfire mitigation on their land
- I think our region is behind in collaborating as a region on hazard mitigation across all these areas, but particularly for wildfire. Manitou Springs, for instance, is only 3 square miles but surrounded by high risk areas. We need to approach wildfire at a regional scale.
- You need to have personnel who have the right experience and success with emergency management. Right now, that is not true - look at EM's dismal failures with the Waldo Canyon and Black Forest wildfires. Even the Colorado State Emergency Management leadership has severely criticized the El Paso Regional Emergency Management leadership. Fix that first!
- We need to look at long term environmental impacts, such as the preservation of wetlands, urban sprawl, lack of infrastructure for bicycles, low-income and high density housing. We can't keep making decisions based on what is good for developers only.
- it's hard to find the prevention plans on the websites
- Make sure that civic and military plans are compatible and interoperable.
- Most government involvement should focus on protecting people's right to defend themselves and their property during chaotic times.
- It's time to start thinking about our natural gas & water supply infrastructure. Our next pandemic may be water born.
- I'd like to see ways to be involved in committees throughout the process and implementation.
- PR Program about OEM. I have read the 2015 HAZ Mitigation Plan and it is a really good start, but I am disappointed in the lack of involvement of this Dept in the EPC Master Plan Process. I have attended ALL Master Plan Steering Committee and other meetings and Hazard Mitigation is all but invisible - but development proceeds as usual.

Fountain Valley News - Your Hometown Community Newspaper

Input for hazard mitigation plan extended through this Saturday

The Pikes Peak Regional Office of Emergency Management (PPROEM) is updating the El Paso County Multi-Hazard Mitigation Plan and invites the public to provide input through Aug. 15. The extended window for public comment allows residents to help guide efforts to identify, assess, and prioritize goals and actions for reducing the effects of natural and human-caused hazards in El Paso County.

Your input will:

• Help emergency managers learn more about the public's perceptions and opinions regarding hazards in the community

• Identify preferred communication channels to inform the public about efforts and to reduce the risks and losses with each hazard and how the public can assist.

• Identify preferred methods and techniques for reducing the risks and losses associated with each hazard.

• Improve public/private coordination, mitigation and risk reduction efforts in the county

The public is invited to learn more about the hazard mitigation process and to complete a survey focused on Community Assets, Goals, and Actions.

"We count on our citizens› input to help improve mitigation efforts and reduce the risk of disaster in El Paso County. Developing a mitigation plan that addresses the unique needs of our community helps to break the cycle of rebuilding after a disaster, only to have repeated damage in the future. It also provides a framework for developing feasible and cost-effective projects that could prevent future damage," said Mike Schaub, Recovery and Mitigation Manager, Pikes Peak Regional Office of Emergency Management.

A requirement for many communities, the Multi-Hazard Mitigation Plan, serves to identify natural and human-caused disasters that may impact the community. Mitigating local hazards can help reduce or eliminate the risk of loss of life, injury, and/or property damage. Thus, aiming to reduce the likelihood that a hazard will result in a disaster. Examples of natural human-caused hazards include: wildfire, hail, flood, drought, winter storms, earthquake, landslide, extreme acts of violence, pandemic, or hazardous material spills.

This plan updates and consolidates the 2015 El Paso County Multi-Jurisdictional Hazard Mitigation Plan and the 2016 City of Colorado Springs Hazard Mitigation Plan to include El Paso County, the City of Colorado Springs, and the jurisdictions within El Paso County. It is prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to achieve eligibility for FEMA hazard mitigation grant programs including:

• Hazard Mitigation Grant Program (HMGP)

• Pre-Disaster Mitigation (PDM)

• Flood Mitigation Assistance (FMA)

• Severe Repetitive Loss (SRL)

• Repetitive Flood Claim (RFC)

In accordance with the Americans with Disabilities Act of 1990 ("ADA"), the Pikes Peak Regional Office of Emergency Management will not discriminate against individuals with disabilities. Anyone requiring assistance to view the plan or provide comments should make the request to the Pikes Peak Regional Office of Emergency Management at Mikeschaub@elpasoco.com, or by calling 719-520-6577.

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Jobless Claims Steady As Airlines Layoff Thousands: BLOG

Community Corner

Public Invited To Weigh In On Hazard Mitigation Plan For El Paso County

The El Paso County Multi-Hazard Mitigation Plan and invites the public to provide input (link is external) through July 21.

By Press Release Desk, News Partner
Jul 3, 2020 1:33 pm MT

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From the City of Colorado Springs:

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July 2, 2020

The Pikes Peak Regional Office of Emergency Management

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The City and County are consolidating their Offices of Emergency Management in an effort to optimize staff resources, establish a single point of contact during major incidences and enhance communication both during and after an event. The new office, the Pikes Peak Regional Office of Emergency Management (PPR-OEM) will support operations during a disaster or emergency in El Paso County and Colorado Springs.

Because disaster knows no jurisdictional boundaries, we can most efficiently prepare for an emergency and respond to one by coordinating our efforts on a regional basis. The establishment of the PPR-OEM will allow the county and the city to more effectively coordinate and assist first responders in an emergency as well as preparing the government and the community for a disaster. (PPROEM) is updating the El Paso County Multi-Hazard Mitigation Plan and invites the public to provide input (link is external) through July 21. The plan continues efforts to identify, assess, and prioritize goals and actions for mitigating the effects of natural and human-caused hazards in El Paso County.

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- **More information on the Hazard Mitigation Plan (link is external).**

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Go to Top

Alerts

- COVID-19 City Response (/alert/covid-19-city-response)
- Burn Ban is in effect (/fire-department/alert/burn-ban-effect)

Public invited to weigh in on hazard mitigation plan for El Paso County

Thu, 07/02/2020 - 10:39am

Plan identifies local hazards, develops strategies to reduce risk and impact of disasters

COLORADO SPRINGS, Colo. — The Pikes Peak Regional Office of Emergency Management (PPROEM) is updating the El Paso County Multi-Hazard Mitigation Plan and invites the public to **provide input (https://hazardmit.wixsite.com/website)** through July 21. The plan continues efforts to identify, assess, and prioritize goals and actions for mitigating the effects of natural and human-caused hazards in El Paso County.

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- Severe Repetitive Loss (SRL)
- Repetitive Flood Claim (RFC)

- **More information on the Hazard Mitigation Plan (https://hazardmit.wixsite.com/website).**

From: Mike Schaub

To: Weinstein, Laura; Mike Duysen; Scot Cuthbertson; Troy Wiitala; Jennifer Irvine; Jim Schanel; Lonnie Inzer; Nora Todd; Lori Cleaton; Lisa Powell; Janel McNair; Ricky Bransford; Brian Olson; Steve Schleiker; Ryan Parsell; EXTERNAL C OBrien; morsej@wsd3.org; mromero@ffc8.org; hastijt@d11.org; cooper@cmsd12.org; dgieck@mssd14.org; brian.grady@asd20.org; chrissmith@esd22.org; timkistler@peyton.k12.co.us; gschmidt@hanoverhornets.org; dcoates@lewispalmer.org; dwatson@d49.org; dslothower@calhanschool.org; dmitchell@calhanschool.org; swilson@bigsandy100J.org; pfrank@edison54jt.org; debra.payne@miamiyoder.org; msantos@coloradocollege.edu; Jim.Barrentine@ppcc.edu; EXTERNAL ssmith3; townclerk@calhan.co; gmftownmanager@gmail.com; Ltingley@fountainpd.com; MGates@fountaincolorado.org; jbreister@comsgov.com; kberchtold@comsgov.com; messam@comsgov.com; jshirk@tomgov.org; tthornish@tomgov.org; bob@palmer-lake.org; Donald.moore@state.co.us; irenemerrifield@state.co.us; Mike McHargue - Lake County Emergency Manager (mike.mchargue@state.co.us); thomas-t@mvea.org; corey.koca@blackhillscorp.com; Broomfield, Sally; drouse@ccharitiescc.org; annie_oatman-gardner@bennet.senate.gov; brad.henley@state.co.us; brandon_gould@gardner.senate.gov; msims@mtc-inc.com; robert.hernandez@coloradosprings.gov; DHerring@theindependencecenter.org; David Mejia; jessicadavis@centura.org; kschroeder@springsgov.com; bootsy.jones@coloradosprings.gov; jack.ladley@coloradosprings.gov; aaron.egbert@coloradosprings.gov; makofsbr@ci.colospgs.co.us; kevin.madsen@coloradosprings.gov; Vance, Jennifer; "James.Muth@ColoradoSprings.gov"; Ryan.trujillo@coloradosprings.gov; EXTERNAL K Melchor; JReid@springsgov.com; bdorris@comsgov.com; Jason Meyer; Orwig, Lorri; "lvigna@hsppr.org"; Leon Kelly; Matt Reid; Eric Barnett (Eric@ppunitedway.org); Lisa Hatfield; Brian Bobeck; Thomas.Buettner@uchealth.org; French, Brigitte; kris.cooper@coloradosprings.gov; Bartlett, Joshua P.; omartinez@fs.fed.us; "Michael.laughlin@state.co.us"; seneely@fedex.com; james.hannon@usaa.com; Gally - CDPS, Marilyn; "Erin Duran"; Jenkins, Jimmy; Mark Thompson - CDPS; Patricia Gavelda

Cc: Bret Daniels; Aaron Hueser; Johnson, Mark C; Schroeder, Kurt; Biolchini, Timothy; Emily Shuman; Todd Thomas; Michael Gates; Noblitt, Steven M.; "Husted, David S."; Arndt, Connie; EXTERNAL Kim Melchor; Zanotto, Eric -FS; Huckabay, Gary; Makofske, Brian T.; Reid, Jim; James Maxon; ppfccmail@gmail.com; jimjrhaus@gmail.com; "pj.langmaid@bffire.org"; NoelSPerran@gmail.com; cfpdchief@calhanfire.org; Karen_Bodine@msn.com; ayork@cimarronhillsfire.org; sleander@crystalparkvfd.org; vburns@wescottfire.org; bhomer@elbertfire.org; EFD3300@gmail.com; tharwig@falconfirepd.org; tharwig@falconfirepd.org; James Maxon; Steve Murphy; hanover3500@aol.com; "John K. Forsett"; chris.miller@us.af.mil; rockymtnmedic@msn.com; dgirardin@securityfiredept.org; swhwy115vfd@gmail.com; chief@shvfd.com; Trc.chief@elpasotel.net; Truty, Chris

Subject: EXTERNAL: Risk Assessment and Mitigation Strategy Workshop - June 22, 2020

Date: Wednesday, June 10, 2020 3:26:21 PM

Attachments: 2020-06-22 Meeting Invitation_Planning Team.pdf

To all:

The Pikes Peak Regional Office of Emergency Management (PPROEM) is continuing the process of updating our regional Hazard Mitigation Plan. In close concert with Michael Baker International, the PPROEM staff would like to invite you to our Risk Assessment and Mitigation Strategy Workshop. Below and attached are the details of the event to include a SHORT questionnaire that will provide us with some useful data to help continue to shape the plan. If you feel that we should invite someone else from your agency for this meeting, please advise.

You will receive a WebEx invite shortly to invite you the Workshop, scheduled for 1000-1200 on June 22nd. During the meeting we will discuss the draft results of the multi-hazard risk assessment for each participating jurisdiction and will discuss additional vulnerabilities. We will also evaluate current mitigation actions & strategies and discuss new actions to reduce risk to hazards.

Respectfully,

Mike Schaub

Mike Schaub, Recovery and Mitigation Manager
Pikes Peak Regional Office of Emergency Management
3755 Mark Dabling Boulevard
Colorado Springs, CO 80907
Cell: (719) 203-0555

mikeschaub@elpasoco.com

Pikes Peak Regional Multi-Hazard Mitigation Plan

Risk Assessment and Mitigation Strategy Workshop

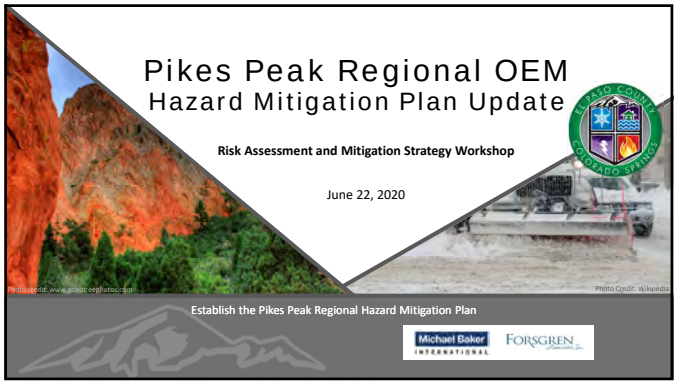
Brought to you by the Pikes Peak Regional Office of Emergency Management

What: At this meeting we will review the draft results of the multi-hazard risk assessment for each participating jurisdiction and will discuss additional vulnerabilities. We will also evaluate current mitigation actions & strategies and discuss new actions to reduce risk to hazards.

Location: WebEx. A calendar invite will follow, please RSVP with your availability.
When: Monday, June 22, 2020
Time: 10am – 12pm
Input Opportunity: As we move forward with the planning process and start talking community assets, goals, and mitigation strategies, we've opened another opportunity for your input. Please use the provided links to **complete Survey #2: Community Assets, Goals, & Actions** and to **provide feedback and/or status updates on the Mitigation Actions from the 2015 Hazard Mitigation Plan**. Please **submit responses by June 18th** so that results can be discussed during the June 22nd Risk Assessment and Mitigation Strategy Workshop. Please note, this survey will also be distributed to the public. As such, some of the questions may be duplicative to those you answered during the February Planning Team Kick-Off meeting. Don't, worry, there are also plenty of new questions and topics that we'd love to get your feedback on.
Links:

- **Complete Survey #2: Community Assets, Goals, & Actions**
- **Provide feedback and/or status updates on the Mitigation Actions from the 2015 Hazard Mitigation Plan**
- **Visit the Project Website**

For questions, please contact Mike Schaub at MikeSchaub@elpasoco.com



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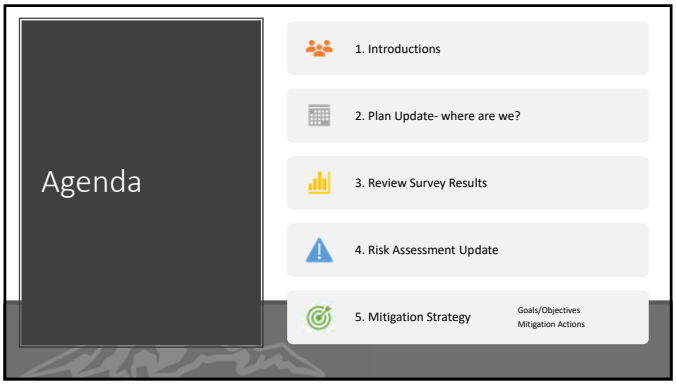

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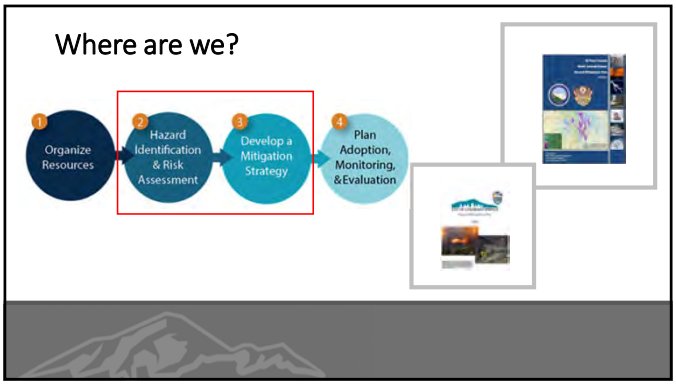

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Survey #1: Hazard Risk & Exposure

Top Hazard Priorities

For the Pikes Peak Region

1. Wildfire
2. Severe Weather (Hail, Drought, Lighting, Tornado, Wind, Winter Storm)
3. Flood (Dam/Levee Failure, Mud or Debris Flow)
4. Geologic (Earthquake, Subsidence & sinkholes, Landslide/Rockfall)
5. Major Transportation Incident (aircraft, rail, highway)

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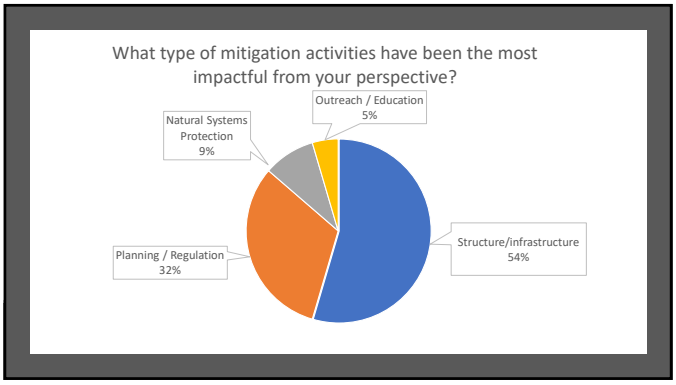

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Survey #2

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Survey # 2:Community Assets, Goals, & Actions

Spread the Word!!

Please help us get the word out on Survey #2, which is now open to you and the public to provide input.

Website
https://hazardmit.wixsite.com/website

The responses will help us better understand:

- How to best communicate with the public about hazards and risks
- What assets are most valued and vulnerable
- Preferred mitigation activities by type to reduce risk (i.e. Land use strategy vs. infrastructure investment)

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Threat and Hazard Identification and Risk Assessment (THIRA)

Draft Results

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THIRA Components

- Definition and Extent
- Previous Occurrences
- Vulnerability
  - Hazard Severity Analysis and Risk Score
  - Exposure & Losses
- Consequence Analysis
- Secondary Hazards
- Future Conditions Impacts
- Land Use and Development
- Summary of Issues

Sample Risk Summary Score

	Probability of Future Occurrence	Severity/ Magnitude	Spatial Extent	Warning Time	Env. Damage	Overall Risk Score
Calhan	1	1	1	1	1	Negligible
Colorado Springs	1.7	3	3	3	2	Moderate
El Paso County	1.7	2.5	2	3	2	Moderate
Fountain	1.7	1.5	1	3	2	Low
Green Mtn Falls	1	1.5	1	1	1	Low
Manitou Springs	2	2	4	3	2	High
Monument	1	1.5	1	1	1	Low
Palmer Lake	1	1	1	1	1	Negligible
Ramah	1	1	1	1	1	Negligible
Regionwide	1.7	3	2	1	2	Moderate

Utilizes numerical values that allow identified hazards to be ranked against one another; the higher the relative risk factor calculated, the greater the hazard risk

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Hazards Profiled

1. Flood, Dam/Levee Failure, Mud or Debris Flow
2. Severe Weather (Hail, Drought & Extreme Heat, Lightning, Tornado, Wind, Winter Storm)
3. Avalanche
4. Geologic (Earthquake, Subsidence & Sinkholes, Landfall/Rockfall)
5. Wildfire
6. Hazardous Materials (Fixed Facility, Transportation, Delivery Lines)
7. Acts of Extreme Violence
8. Cyber Attack
9. Pandemic/Epidemic
10. Major Transportation Incident (Aircraft, Rail, Highway)

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Flood

Dam & Levee Failure

Mud & Debris Flow

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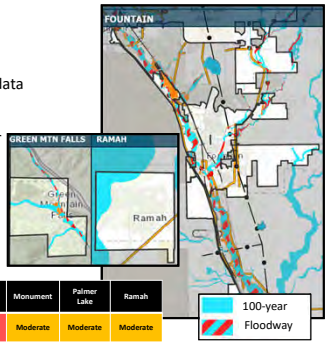
Flood

Hazard data

- FEMA National Flood Hazard Layer data (as of June 2020)
- Flood depth grids for the SFHAs (El Paso's 10ft DEM for elevation, 100yr floodplains for extents)

Risk & Vulnerability

- Structure & Loss Estimates
- Critical Facilities
- Isolated deaths & multiple injuries
- Minimal warning



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Moderate	High	High	Moderate	Moderate	High	Moderate	Moderate	Moderate

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Flood

100-year HAZUS Flood Loss Estimates, by Address Point

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Flood

Potential Exposure to 100-year Floodplain

	Geographic Area (%)	Structure (Count)	Structure Market Value (100% Damage)	Population (Count)	Critical facilities (Count)
Calhan	5%	1	$275,034	0	3
Colorado Springs	3%	865	$244,004,870	1,999	119
El Paso County	5%	955	$94,584,795	1,802	163
Fountain	10%	20	$3,218,453	33	14
Green Mtn Falls	10%	31	$6,919,729	47	1
Manitou Springs	7%	172	$54,008,422	301	5
Monument	5%	3	$409,084	2	5
Palmer Lake	4%	9	$468,947	17	3
Ramah	17%	0	$0	0	1

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Flood Actions to Consider

- Community Rating System Program Participation
- Conservation/Cluster Zoning/Subdivision
- Flood Insurance Coverage
- Are there buyout candidates?
- Are there elevation/relocation candidates?
- Stormwater considerations- Green infrastructure
- Flood Risk Communication

CURRENT CRS CLASSIFICATION	
Calhan	NA
Colorado Springs	5
El Paso County	7
City of Fountain	7
Green Mountain Falls	7
Manitou Springs	7
Monument	7
Palmer Lake	7
Ramah	Not Participating

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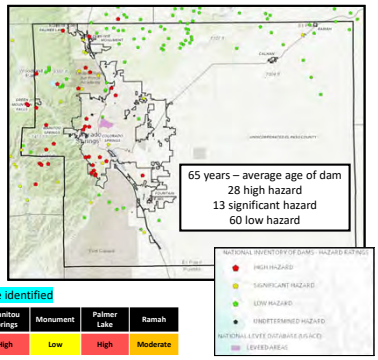
Levee & Dam Failure

Hazard data

- Previous occurrences
- Hazard potential classification
- Difficult to determine exposure extents and losses without knowledge of inundation zones

Risk & Vulnerability

- Structures/Parcels
- Critical Facilities & Infrastructure
- Loss of Life Potential



Note: Table to be updated once inundation areas are identified

Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Moderate	Moderate	Low	Moderate	Moderate	High	Low	High	Moderate

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Levee & Dam Failure Actions to Consider

- Focus is on preventing loss of life rather than protection of property, infrastructure, etc.
  - Dam failure warnings
  - Evacuation Routes
  - Site-specific Emergency Action Plans (critical facilities, etc)
- Additional hazard data development
  - Dam Breach Analysis (inundation areas)
- Dam-specific mitigation
  - Future dam improvements/retrofits
  - Instrumentation and monitoring
  - Release guidelines

Photo Source: Coloradosprings.gov

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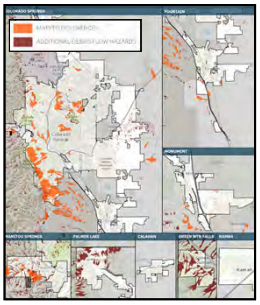
Mud & Debris Flow

Hazard data
- Previous occurrences
- Susceptibility areas

Risk & Vulnerability
- Slope
- Areas below burn scars
- Structures/Parcels
- Critical Facilities & Infrastructure
- Loss of Life Potential



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Negligible	High	Moderate	Low	Moderate	High	Low	Moderate	Negligible

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Mud & Debris Flow

Potential Exposure to Mud & Debris Flow Hazard (only exposed jurisdictions shown)

	Geographic Area (%)	Structure (# / %)	Structure Market Value (100% Damage)	Population (# / %)	Critical facilities (#)
Colorado Springs	12%	11,856 / 9%	$4,493,770,021	35,209 / 8%	21
El Paso County	3%	2,105 / 3%	$458,508,203	2,672 / 2%	18
Fountain	2%	1 / 0.01%	$26,906	0	4
Green Mtn Falls	28%	112 / 30%	$25,290,496	203 / 30%	1
Manitou Springs	21%	528 / 25%	$138,407,839	1,260 / 25%	4
Monument	1%	3/ 0.1%	$3,334,471	0	2
Palmer Lake	19%	339 / 27%	$80,964,559	674 / 27%	3

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Mud & Debris Flow Actions to Consider

- Zoning and use restrictions
- Buyout programs
- Installation of debris fences

Photo Source: PPROEM

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When poll is active, respond at PollEv.com/mbipoll243
Text MBIPOLL243 to 22333 once to join

Other considerations and/or actions related to Flood, Dam/Levee Failure, and Mud/Debris flow?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

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Severe Weather

Hail
Drought & Extreme Heat
Lightning
Tornado & Wind
Winter Storm

Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

Source: Jay Janner/The Gazette

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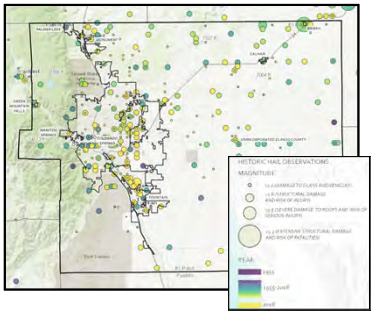
Hail

- Hazard data
  - Previous occurrences
    - Location/Size
    - Damages & injuries
- Risk & Vulnerability
  - All areas exposed
  - Population Density- buildings & people
  - Outdoor recreation



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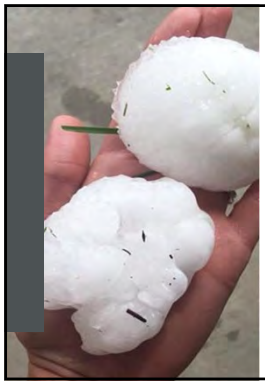


Hail
Actions to Consider

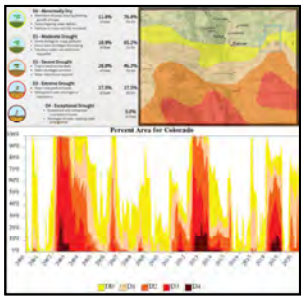
- Safe Rooms/cover facilities in open spaces
- Hail-resistant shingles

Photo: Hail at Fort Carson, August 6, 2018. Source: NWS

25

Drought & Extreme Heat

- Hazard data
  - Historic Information
    - Historic drought record
    - Rainfall trends
    - Days with extreme heat
  - Available water supplies
- Risk & Vulnerability
  - Commerce
  - Tourism/recreation/economic/ environmental/ agricultural/ societal impacts
  - Wildfire protection
  - Vulnerable populations



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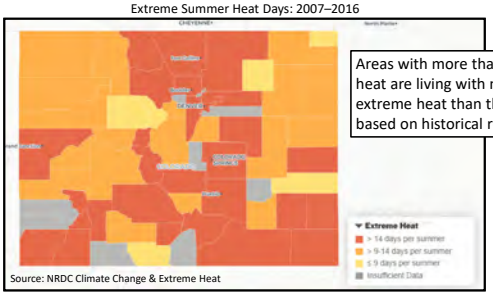
Drought & Extreme Heat

Extreme Summer Heat Days: 2007–2016



Areas with more than 9 days of extreme heat are living with more days of extreme heat than they did in the past, based on historical records.

Source: NRDC Climate Change & Extreme Heat

27

Drought & Extreme Heat
Actions to Consider

- Establish early warning systems, cooling centers, and hospital and health system preparedness plans
- Plant trees and use cooler paving and roofing materials
- Develop agreements for secondary water sources
- Mandatory water conservation during drought

Photo Source: Westword

28

Winter Storm

Hazard Data
- Previous Occurrences
  - Severe winter weather events occurred in EPC on 132 separate dates between 2000 – 2019
- Snowfall totals
- Wind

Risk and Vulnerability
- Property damage
- Social vulnerability- elderly, special needs, etc.
- Power and telephone outages, isolated areas
- Closures of streets, highways, schools, businesses, and nonessential government operations
- Obstructed commuter routes

BAPTIST ROAD IN EL PASO COUNTY, MARCH 13, 2019

BOMB CYCLONE, MARCH 13, 2019

29

Winter Storm
Actions to Consider

- Roof loading and design reqs
- Building insulation upgrades
- Tree maintenance near/around power lines
- Power line design
- Snow fences
- Heated sidewalks/roadways
- Outreach/preparedness activities for vulnerable populations

Photo Source: El Paso County Search and Rescue

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Other considerations and/or actions related to Severe Weather Hazards?

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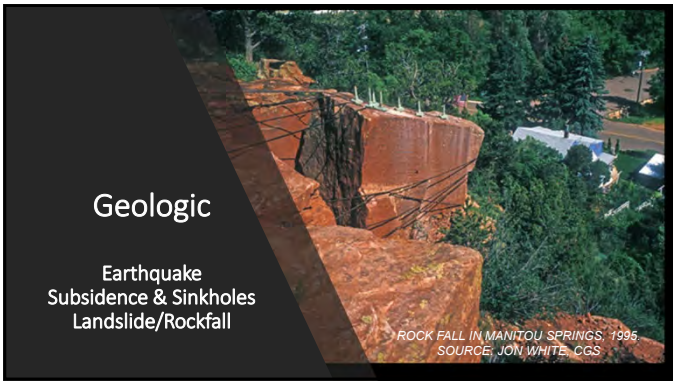


Geologic

Earthquake
Subsidence & Sinkholes
Landslide/Rockfall

32

Earthquake

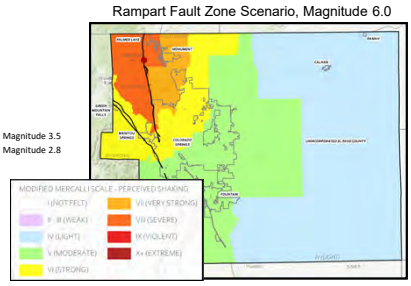
Hazard data

- Previous occurrences
  - Epicenter/magnitude
    - **12/23/95** – Manitou Springs area, Magnitude 3.5
    - **12/31/95** – Manitou Springs area, Magnitude 2.8
  - Damages & injuries
- Faults
- Peak ground acceleration

Risk & Vulnerability

- Buildings
- Interruption of services
- Isolated areas
- Loss of Life

Rampart Fault Zone Scenario, Magnitude 6.0



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Low	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Low

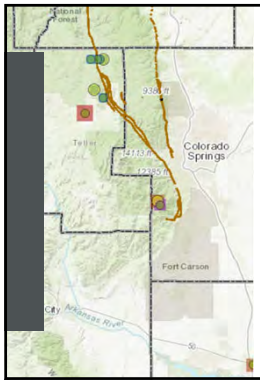
33

Earthquake

Critical Facility Impacts, Rampart Fault Scenario, 6.0 Magnitude

	Total Number of Facilities	Slight Damage	Moderate Damage	% Functional @ Day 1	% Functional @ Day 14
Highway Bridges	657	1	2	99%	100%
Rail Bridges	77	0	0	100%	100%
Communications	32	0	0	99%	100%
Government Functions	2	0	0	70%	87%
Medical and Health	12	0	0	76%	90%
Power	8	1	0	92%	99%
Protective Functions	88	4	5	77%	89%
Schools	282	11	4	77%	90%
Transportation	9	4	1	93%	97%
Wastewater	54	10	2	80%	98%
Water Supply	2	0	0	92%	100%
Total/Average	**1,223**	**31**	**14**	**87%**	**95%**

34



Earthquake Actions to Consider

- Install shutoff valves and emergency connector hoses where water mains cross fault lines
- Use flexible piping when extending water, sewer, or natural gas service.
- Residential seismic retrofits based on type of construction
- Provide Information to homeowners on Structural and Non-Structural Retrofitting
- Earthquake insurance

Photo: El Paso County Fault Locations & Past Incidents

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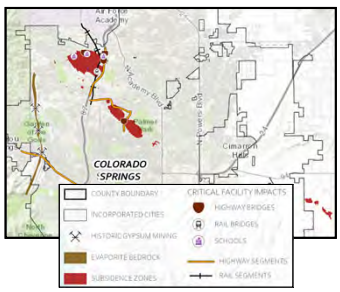
Subsidence & Sinkholes

Hazard data

- Previous occurrences
- Historic movement
- Mine Locations

Risk & Vulnerability

- Buildings
- Infrastructure



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Negligible	Moderate	Low	Negligible	Negligible	Low	Negligible	Negligible	Negligible

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Subsidence & Sinkholes

Potential Exposure to Subsidence & Sinkhole Hazard (only exposed jurisdictions shown)

	Geographic Area (%)	Structure (# / %)	Structure Market Value (100% Damage)	Population (# / %)	Critical facilities (#)
Colorado Springs	1.87%	5,668 / 9%	$2,729,757,924	16,569 / 4%	9
El Paso County	0.02%	251 / 3%	$53,289,951	396 / 0.2%	2
Manitou Springs	0%	3 / 25%	$2,065,646	8 / 0.1%	1

37

Subsidence & Sinkholes Actions to Consider

- Mapping mine extents
- Development regulations

Photo: George Hager stands near a pipe that drains the sand, water, and tailings mixture from the Golden Cycle Mill in El Paso County. Source: The Gazette

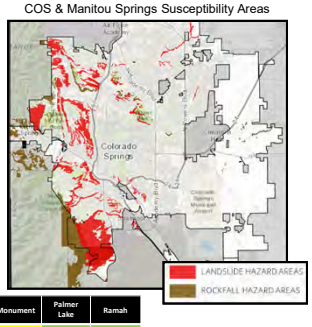
38

Landslide / Rockfall

Hazard data
- Previous occurrences
- Susceptibility areas
- Erosion

Risk & Vulnerability
- Buildings
- Transportation Features
- Critical Facilities

COS & Manitou Springs Susceptibility Areas



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Negligible	Moderate	Low	Low	Low	Moderate	Low	Negligible	Negligible

39

Landslide / Rockfall

Potential Exposure to Landslide / Rockfall Hazard (only exposed jurisdictions shown)

	Geographic Area (%)	Structure (# / %)	Structure Market Value (100% Damage)	Population (# / %)	Critical facilities (#)
Colorado Springs	27%	5,668 / 4%	$2,729,757,924	16,569 / 4%	21
El Paso County	2%	251 / 0.3%	$53,289,951	396 / 0.2%	6
Fountain	1%	0	$0	0	1
Manitou Springs	24%	3 / 0.1%	$2,065,646	8 / 0.1%	2

40

Landslide / Rockfall Actions to Consider

- Development regulation
  - Setbacks
  - Use
- Building removal/relocation
- Disclosure during real-estate transactions
- Slope/soil stabilization techniques
- Rockfall netting
- Energy dissipators in debris flow areas

Photo: Constellation drive landslide, Colorado springs, August 2015. Source: T.C. Wait, Colorado Geological Society

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Other considerations and/or actions related to Geologic Hazards?

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Wildfire

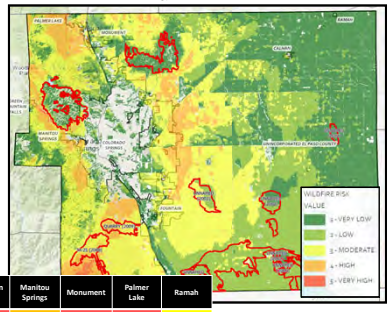
Hazard data

- Previous occurrences
  - Location/Size
  - Damages
- Burn probability
- Risk rating

Risk & Vulnerability

- Wildland/Urban Interface
  - Buildings & Infrastructure
  - Previous mitigation (thinning, prescribed burns)

Wildfire Risk & Historic Fire Perimeters



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Moderate	Moderate	High	Moderate	High	Moderate	High	High	Low

44

Wildfire

Potential Exposure to Moderate to Very High Wildfire Risk Areas (only exposed jurisdictions shown)

	Geographic Area (%)	Structure (# / %)	Structure Market Value (100% Damage)	Population (# / %)	Critical facilities (#)
Calhan	10	16 / 3%	$2,730,782	16 / 3%	1
Colorado Springs	24%	1,184/ 1%	$577,940,696	2,803 / 1%	9
El Paso County	31%	19,212 / 26%	$4,303,197,507	32,760 / 21%	64
Fountain	40%	227 / 3%	$54,557,026	569 / 2%	9
Green Mtn Falls	92%	342 / 91%	$73,393,920	615 / 92%	2
Manitou Springs	36%	119 / 6%	$50,787,300	264 / 5%	2
Monument	33%	72 / 3%	$22,878,045	127 / 2%	7
Palmer Lake	48%	311 / 25%	$116,191,616	650 / 6%	2

45

Wildfire Actions to Consider

- Explore wildfire mitigation program in coordination with insurance companies and fire department

Photo: MM 117 Fire, April 17, 2018. Source: The Gazette.

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Other considerations and/or actions related to wildfire?

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Human-Caused Hazards

Hazardous Materials
Extreme Acts of Violence
Cyber Attack
Pandemic/Epidemic
Major Transportation Incident

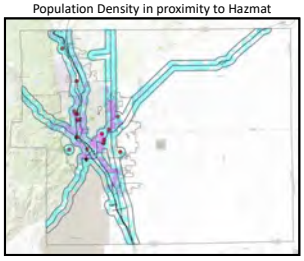
48

Hazardous Materials

Hazard data
- Previous occurrences
  - Location
  - Damages
- Facility location, transit routes

Risk & Vulnerability
- Proximity to rail, highways, and facilities
- Critical facilities – schools, healthcare, other hazardous material facilities
- Multiple deaths/injuries

Population Density in proximity to Hazmat



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Moderate	High	High	High	Moderate	High	Moderate	Moderate	Moderate

49

Hazmat Actions to Consider

- Investing in Hazmat response teams
- Notification of proximity to hazmat facilities during real estate transactions
- Outreach & Education

Photo Source: 5280fire.com

50

Extreme Acts of Violence

How to define?

Hazard data
- Previous occurrences
- Mechanism of attack (eg active shooter, bioweapon, explosive attack)
- Ideological motivation

Risk & Vulnerability
- Vulnerable populations
- Large gatherings, schools, movie theaters, etc.

Laying flowers Saturday, Nov. 28, 2015, in honor of the victims of the deadly shooting at a Planned Parenthood clinic in Colorado Springs. Source: CBC

Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Low	Moderate	Low	Low	Low	Low	Low	High	Low

51

Extreme Acts of Violence Actions to Consider

- Training & equipping SWAT and emergency response personnel
- Educating and training school personnel in response to active shooters
- Developing preparedness plans for large gatherings

Photo Source: El Paso County Sheriff

52

Cyber Attack

Hazard data
- Types of attacks
- Previous occurrences

Risk & Vulnerability
- Privacy & Records
- Critical Facilities
- Financial Crime

Source: Greensfelder

Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Low	Moderate	Low	Moderate	Low	Low	Low	Low	Low

53

Cyber Attack Actions to Consider

- Aggressive vulnerability testing – Certified Ethical Hackers to test the security posture of critical systems and infrastructure
- Outreach & Education – Proactive IT support to ensure systems are patched and secure
- Focus on Supervisory Control and Data Acquisition (SCADA) eg protecting critical infrastructure from cyber sabotage

Photo Source: m.economictimes.com

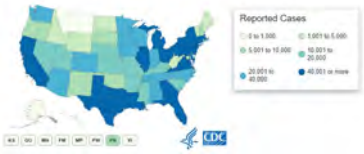
54

Pandemic

Hazard data
- Previous occurrences

Risk & Vulnerability
- High-risk groups
- Economy
- Supplies, personnel, public health and healthcare systems
- Closure of schools, government, and non-essential businesses
- Multiple deaths and injuries

CORONAVIRUS CASES REPORTED AS OF JUNE 12, 2020



Calhan	COS	EPC	Fountain	Green Mtn Falls	Manitou Springs	Monument	Palmer Lake	Ramah
Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

55

Pandemic Actions to Consider

- Programs to improve overall health and bolster immune systems
- Availability of local medical resources and personnel
- Training for mass casualty events

Photo Source: Post Independent

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Other considerations and/or actions related to human-caused hazards?

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Actions related to all Hazards

- Hazard risk communicated during real estate transactions.
- Coordinate with El Paso County Planning to support and advance hazard considerations in zoning updates and amendments.
- Share and educate other El Paso County Departments on the availability and utility of hazard mitigation plan data, strategies and actions.

58

Mitigation Strategy Goals

The following mitigation guiding principles, goals and objectives are for consideration by the Planning Team. The statements below are a composite of the goals and objectives approved in the former COS and EPC Hazard Mitigation Plans.

59

GUIDING PRINCIPLES

Reduce or eliminate risks to life safety and property in the Pikes Peak region from natural and human-caused hazards, incidents/events.

Sustain successful measures that reduce exposure to future disaster losses and implement other measures that strengthen the disaster preparedness of the community.

Institute pro-active comprehensive preparedness and mitigation programs involving government entities, in partnership with other agencies, other partners, and the public to reduce the effects of a disaster as well as reduce the time and resources required for response and recovery.

60

Goals Discussion

There are six goals we will review along with the objectives

Goals: What we want to achieve.

Objectives: How we want to achieve it.

Review each goal and provide feedback

Did we miss anything or do you have other general feedback?

61

Goal 1

Reduce loss of life and injury.

Objective 1.1: Explore current emergency notification systems to ensure reliable, diverse and redundant public communication of potential hazards

Objective 1.2: Ensure all municipalities within the County have a well prepared, implementable, and vetted emergency operations plan

Objective 1.3: Review and assess County and local plans for current best practices, standards, and appropriate integration of risk reduction elements resulting in a more resilient community

Objective 1.4: Assess and improve hazard-specific mapping and warning systems associated with high risk hazards to provide accurate and accessible information to ensure that citizens and visitors can respond appropriately

62

Goal 1: Reduce loss of life or injury - Does this represent the goals of the PPROEM HMP?

Yes, very much.

Yes, somewhat.

Neutral

No, it isn't quite right.

No, not at all.

63

Goal 2

Reduce economic and property losses.

Objective 2.1: Proactively protect and reduce vulnerability of critical facilities, infrastructure, and other key community assets from hazards

Objective 2.2: Develop and implement strategies that make public and private properties more resistant to the impact of hazard events and explore potential incentives for businesses and residents to improve disaster resistance

Objective 2.3: Facilitate businesses within the County in developing Continuity of Operations Plans

Objective 2.4: Identify federal, state and other local legislation that impacts emergency management activities

Objective 2.5: Leverage financial assistance and other resources to strengthen the Counties disaster resiliency.

64

Goal 2: Reduce economic and property losses - Does this goal represent the goals of the PPROEM HMP?

Yes, very much.

Yes, somewhat.

Neutral

No, not really.

No, not at all.

65

Goal 3

Empower personal preparedness and responsibility by improving communication about risks and threats.

Objective 3.1: Improve community education programs to increase awareness of hazards and mitigation opportunities to reduce personal risk to citizens

Objective 3.2: Identify creative and alternative cost effective methods to provide multiple public education forums to teach citizens how to mitigate natural hazards on their property

Objective 3.3: Take proactive steps to ensure businesses and residents have information regarding necessary resources available to them pre, during and post an event

66

Goal 3: Empower personal preparedness and responsibility by improving communication about risks and threats. - Does this goal represent the PPROEM HMP?

Yes, very much.
Yes, somewhat
Neutral
No, not really
No, not at all

67

Goal 4

Improve collaboration and cooperation throughout El Paso County and partnering jurisdictions.

Objective 4.1: Develop and implement strategies to improve communication and coordination of mitigation activities between federal, state and local governments, as well as private and non-profit organizations

Objective 4.2: Increase the level of coordination between all stakeholders in order to effectively and efficiently implement preparedness and mitigation strategies

Objective 4.3: Establish multi-jurisdictional methodologies and inter-operability to allow better information sharing and resource

68

Goal 4: Improve collaboration and cooperation throughout El Paso County and partnering jurisdictions.

Yes, very much.
Yes, somewhat.
Neutral
No, not really.
No, not at all.

69

Goal 5

Incorporate hazard mitigation into all applicable plans and policies.

Objective 5.1: Incorporate hazard analysis and emergency preparedness planning into County and local future development planning

Objective 5.2: Integrate mitigation priorities with watershed and storm water planning, natural resource management, and sound land use planning to protect life, property and the environment

Objective 5.3: Implement the All-Hazard Mitigation Plan proactively and effectively by clearly communicating the process for plan implementation, maintenance and updates

Objective 5.4: Continue to improve the regulatory review process for development and construction in the vicinity of known hazard areas.

70

Goal 5: Incorporate hazard mitigation into all applicable plans and policies. - Does this goal represent the goals of the PPROEM HMP?

Yes, very much.
Yes, somewhat.
Neutral
No, not really.
No, not at all.

71

Goal 6

Strategically plan for continuity of government services and business operations.

Objective 6.1: Identify needs and leverage available funding streams to improve public safety, response, and recovery programs to ensure essential services can be maintained

Objective 6.2: Develop effective primary and alternate emergency operations facilities to facilitate effective incident/event support

Objective 6.3: Partner with local businesses, Chamber of Commerce and Non-Governmental Organizations (NGOs) that provide critical services to residents to ensure continuity of services and a coordinated response

72

Goal 6: Strategically plan for continuity of government services and business operations. - Does this goal represent the goals of the PPROEM?

Yes, very much.
Yes, somewhat.
Neutral
No, not really.
No, not at all.

73

Discussion Questions

- Are there other critical goals that we should consider?
- Should any of these be reworked?
- Other considerations?

Draft Goals

1. Reduce loss of life and injury.
2. Reduce economic and property losses.
3. Empower personal preparedness and responsibility by improving communication about risks and threats.
4. Improve collaboration and cooperation throughout El Paso and partnering jurisdictions.
5. Incorporate hazard mitigation into all applicable plans and policies.
6. Strategically plan for continuity of government services and business operations.

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What's left?

- Refinement of final Risk Assessment data
- Finalize capabilities assessment
- Continued coordination with PPROEM, Participating Communities, Stakeholders, and the Public
- Continued collection and prioritization of mitigation projects/actions
- Finalization of Draft Plan

Date	Task
Late July, 2020	Release of draft HMP update to Planning Team
Early-August, 2020	Public release of Draft HMP Update at open house event
Mid-August, 2020	Public comments on HMP update due
Mid-August, 2020	Submission to State

75

El Paso County is engaging in a planning process for a new countywide Master Plan.

Provide input to help guide the future of the County.

Follow this link to learn more and provide input

https://elpaso-hlplanning.hub.arcgis.com/

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Pikes Peak Regional OEM Hazard Mitigation Plan

Risk Assessment & Mitigation Strategy Workshop
June 22, 2020

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Results Summary

Input from LPC MTG #2: HIRA Mitigation & Strategy Meeting

Enter your name, jurisdiction/agency, and role

"Mike Duysen, "

"Dusty Dezell, City of COS, IT "

"Pikes Peak Regional Office of Emergency Management "

"Karen Berchtold, Manitou Springs "

"Bill Murphy, Colorado Springs Utilities - Emergency Management and Security Operations "

"Jack Ladley, City of Colorado Springs Public Works Operations and Maintenance "

"Lauren McCoy PPROEM Emergency Preparedness Planner "

"Jen Vance, City of Colorado Springs, Finance/Grants Admin "

"Children's Hospital Colorado- Colorado Springs "

"Brad Dorris, Manitou Springs Fire Department, Emergency Mangement "

"Mike Schaub PPROEM "

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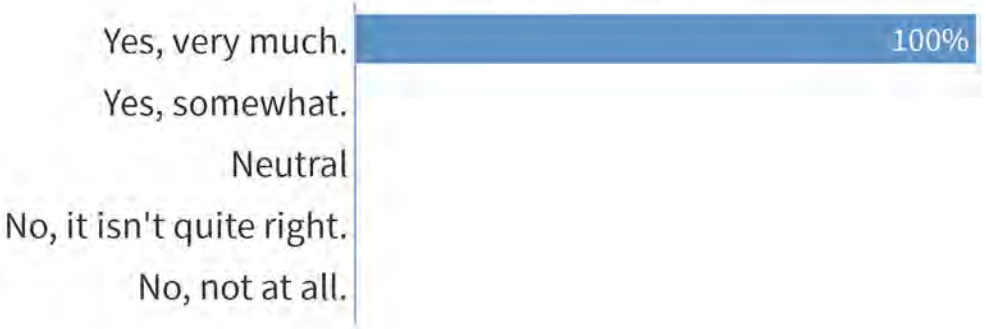
Goal 1: Reduce loss of life or injury - Does this represent the goals of the PPROEM HMP?



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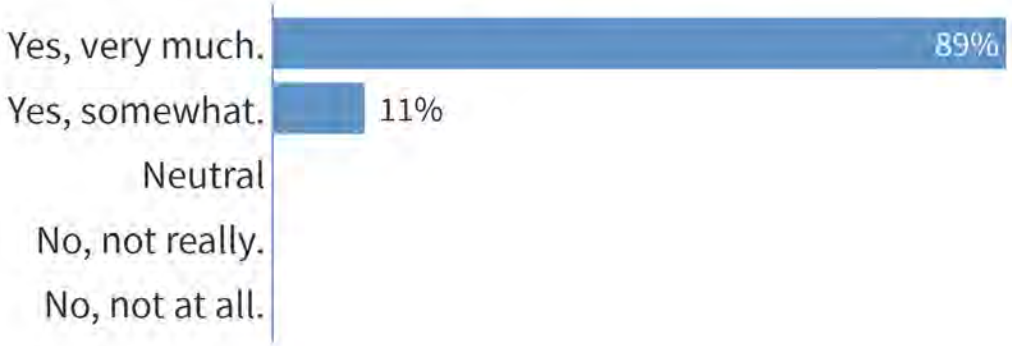
Goal 2: Reduce economic and property losses - Does this goal represent the goals of the PPROEM HMP?



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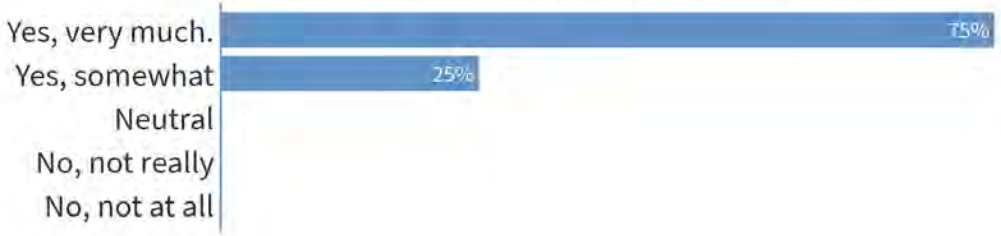
Goal 3: Empower personal preparedness and responsibility by improving communication about risks and threats. - Does this goal represent the PPROEM HMP?



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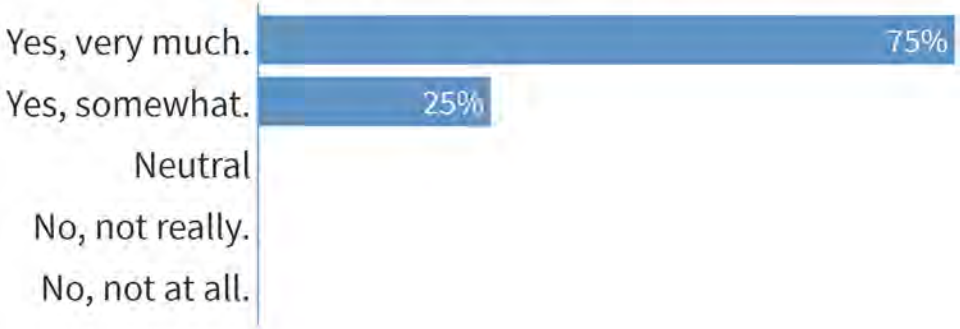
Goal 4: Improve collaboration and cooperation throughout El Paso County and partnering jurisdictions.



Input from LPC MTG #2

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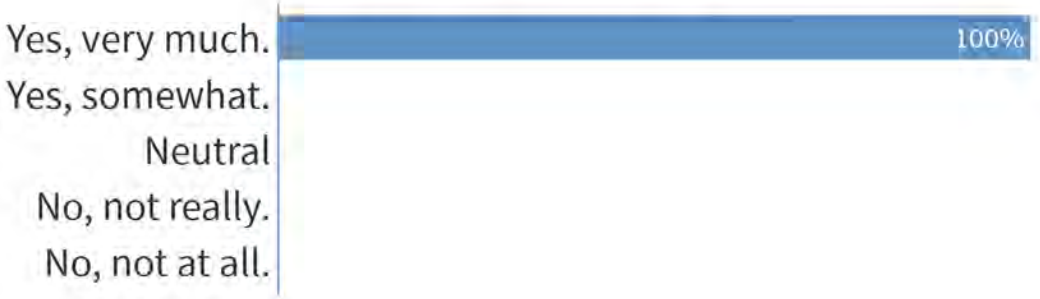
Goal 6: Strategically plan for continuity of government services and business operations. - Does this goal represent the goals of the PPROEM?

When poll is active, respond at **PollEv.com/mbipoll243**
Text **MBIPOLL243** to **22333** once to join

Goal 5: Incorporate hazard mitigation into all applicable plans and policies. - Does this goal represent the goals of the PPROEM HMP?



Other considerations and/or actions related to Flood, Dam/Levee Failure, and Mud/Debris flow?

"After Waldo Canyon fire much has been put into place regarding flooding. Updated flood maps and building construction was updated as well ."

Other considerations and/or actions related to Geologic Hazards?

No responses received yet. They will appear here...

Input from LPC MTG #2

Other considerations and/or actions related to human-caused hazards?

"Teleworking and social distancing plans"

"Pandemic - stockpiling PPE"

Other considerations and/or actions related to Severe Weather Hazards?

"None"

Other considerations and/or actions related to wildfire?

"For cyber attacks all should be at least moderate. For those that listed low I fear they do not understand the current risks that are out there."

"- actively support grant submittals by agencies for grants for fire mitigation"

"None"

Input from LPC MTG #2

From:	Schaub, Michael P
To:	ltingley@fountaincolorado.org; Erica Romero; townclerk@calhan.co; gmftownmanager@gmail.com; cabeyta@comsgov.com; kberchtold@comsgov.com; bob@palmer-lake.org
Cc:	Lonnie Inzer; Madsen, Kevin; Weinstein, Laura
Subject:	RE: Hazard Mitigation Plan: Community Profiles and Capabilities Chapter - Please Comment NLT September 3rd

To all local communities:

Our consultant wanted me to remind you that each local community has a matrix to review as well; page numbers below:

In addition to the pages referenced in your email below, each community also has a two to three capability matrices that require a second look. The associated page numbers are below.

- Calhan: Page 65
- Colorado Springs: 83
- El Paso: page 63
- Fountain: Page 67
- Green Mountain Falls: Page 70
- Manitou Springs: Page 72
- Monument: Page 75
- Palmer Lake: Page 78
- Ramah: Page 81

From: Schaub, Michael P
Sent: Monday, August 31, 2020 10:56 AM
To: 'ltingley@fountaincolorado.org' <ltingley@fountaincolorado.org>; 'Erica Romero' <eromero@tomgov.org>; 'townclerk@calhan.co' <townclerk@calhan.co>; 'gmftownmanager@gmail.com' <gmftownmanager@gmail.com>; 'cabeyta@comsgov.com' <cabeyta@comsgov.com>; 'kberchtold@comsgov.com' <kberchtold@comsgov.com>; 'bob@palmer-lake.org' <bob@palmer-lake.org>
Cc: 'Lonnie Inzer' <LonnieInzer@elpasoco.com>; Madsen, Kevin <Kevin.Madsen@coloradosprings.gov>; 'Weinstein, Laura' <Laura.Weinstein@mbakerintl.com>
Subject: Hazard Mitigation Plan: Community Profiles and Capabilities Chapter - Please Comment NLT September 3rd

To all Local Government Officials:

PPROEM's Hazard Mitigation Plan (HMP) rewrite is progressing nicely thanks to your help. One of the final chapters to be finalized is the community profiles and capabilities. Our team has taken previous versions of the HMP and updated the community profiles and capabilities section where we could. **However, we need your help in ensuring it reflects the most up-to-date info for our 2020 rewrite. With that in mind, I respectfully request that each local community listed below take a few minutes and provide any feedback/changes/deletions to our draft by this Thursday (September 3rd) COB.** Below lists the local communities and the page number that represents the

beginning of their entry in this critical chapter:

- Calhan: Page 30
- Fountain: Page 34
- Green Mountain Falls: Page 39
- Manitou Springs: Page 42
- Monument: Page 48
- Palmer Lake: Page 55
- Ramah: Page 58

These sections are short and range between two and five pages in length for each local community. Again, I ask that you provide any feedback/changes/deletions NLT this Thursday, September 3rd, by the end of the day.

Thank you in advance for your help!

Mike Schaub

El Paso County

Improve Multi-Jurisdictional Hazard Mitigation Plan

- Pikes Peak Regional Office of Emergency Management is currently updating the regional Hazard Mitigation Plan. Expected date of adoption: October 31st, 2020.

Review and Update EOP

- A Pikes Peak Regional Office of Emergency Management EOP is expected to be finalized NLT October 2020.

Construction of a Community Shelter on County Fairgrounds Property

- Explore the development and construction of 1-2 community shelters for inclement weather that will hold 100-200 private citizens per structure during hazardous weather events

Perform Continuity of Operations Planning

-This an ongoing project. The Pikes Peak Regional Office of Emergency Management created a Continuity of Operations Plan template and distributed it to various county agencies including Department of Public Works, Administration and Public Health. Several exercises have been conducted and improvement plans have been implemented.

Partner with Local Businesses, CoC, NGOs to provide critical services

-The Multi-Agency Coordination Group is a collaboration of diverse organizations and agencies in the Pikes Peak Region. The group meets quarterly and focuses on plans for the wellbeing of the community. Voluntary Organizations Active in Disaster (VOAD) is a member of this group. VOAD also meets quarterly with its members to discuss providing critical resources to the community following a disaster.

Enhance Awareness and Preparedness of Residents

-This is an ongoing project. El Paso County CERT continues to conduct regular trainings and exercises to meet the needs of the community.

Enhance Emergency Preparedness Information and Community Outreach

-This an ongoing project. El Paso County maintains a website that includes preparedness information on numerous hazards. Social media efforts and electronic newsletters are used for distributing information as well as public presentations and participation in community events to promote preparedness throughout the year. Specific events and dates are detailed in the Pikes Peak Regional Office of Emergency Management Community Preparedness Public and Community Outreach Plan.

Develop Emergency Preparedness Public Service Announcements and Educational Content

-This is an ongoing project. An informational video is posted on the website and the County YOUTube Channel. The video contains a description of emergency management and the need for emergency preparedness. OEM is working with the EPC Communications office planning to pre-produce video messaging for evacuations, blizzards, and other predictable circumstances. OEM is working also with County PIOs to pre-script messaging for social media and news releases when educational content is needed. The County also utilizes localized seasonal education messaging provided by Colorado DHSEM.

Multi-faceted Public Awareness Campaign to Increase Enrollment in Emergency Notification System

-This is an ongoing project. This is part of El Paso Teller 911. This messaging is incorporated into all public presentations, events, trainings, and publications.

Create an All-Hazard Zoning Plan

- Evacuations and an all-hazard zoning plan will be included in the Pike Peak Regional Office of Emergency Management Evacuation Plan to be completed in 2021.

Encourage Communities to Adopt Fire Adaptive Community Standards

-This is an ongoing project. Since 2017, there have been 4 Fire Adaptive Community workshops. CERT Volunteers have been trained to provide outreach and assistance to communities for Wildfire risk assessments.

Identify Areas for Cisterns or Hydrants

-This is an ongoing project. In light of recent fires of 2018, identifying alternate resources for water in rural areas will become a priority.

Mitigation Efforts on Publicly Owned Properties Based on Fire Adaptive Community Standards

-This is an ongoing project. The El Paso County Sherriff's Office Wildland Team performs mitigation projects based on required standards on a regular basis. For example, the Wildland Team is currently working on a fire break project just north of Pikes Peak International Raceway.

Conduct Hazardous Materials Flow Study

This project is complete/ongoing. Several hazardous material flow studies have been conducted since 2016. The locations of the flow studies include Eastern and Western Highway 24, Highway 94, and I-25.

Increase Number of Personnel Trained as HAZMAT Technicians and Specialists

-This is an ongoing project. The Pikes Peak Regional Office of Emergency Management HazMat Team is made up of mostly volunteers. Recruiting new members is a continuous process. The HazMat Team conducts monthly trainings in addition to the many events that they respond to.

Acquire Software for Facility Tracking and Multi-Jurisdictional Response

-This is an ongoing project. Colorado Environmental Online System (CEOS) handles a variety of environmental reporting requirements at CDPHE. EPA's free Tier 2 Submit software and CAMEO are also software options.

Expand Local Emergency Planning Committee

-Local Emergency Planning Committee meetings are held quarterly. An agenda is created and posted prior to the meeting. Sign in sheets and minutes are obtained. The minutes are posted and distributed as required.

Enhance Communication Network Related to Delay or Closure of County Facilities and Roadways

-The El Paso County Public Information Office along with the Crisis Communication Network works closely with local media to distribute information regarding facility and road closures affecting the public, as information on emergency notifications is created.

Identify Critical Roads and Emergency Routes

-This is addressed in the El Paso County Department of Public Works Street Priority List.

Reduce Roadway Hazards

-This is an ongoing project. Regular maintenance of roadways for ingress and egress remains a priority for the El Paso County Department of Public Works through daily operations.

Develop Strategic Flood Warning Plan

-This is an ongoing project. Everbridge, Reverse 911, and sirens are used as warning systems. Pikes Peak Regional Office of Emergency Management offers several sky warn and weather spotter classes throughout the year for the community.

Identify Drainage Basins that Require Flood Warning Systems and Explore Early Warning Systems for Flash Floods

-This is a completed/ongoing project. Drainage basins have been installed and are maintained. Rain gauges have been installed by the USGS and are monitored.

Install Electronic Warning Signs and Road Closure Barriers on Highway 24

-This project has been completed. Highway signs and variable message boards have been installed along the Highway 24 corridor.

Maintain Catch Basins and Debris Fences in Critical Areas

-This is an ongoing project. Catch basins have been installed at the Cascade Channel and debris nets have been installed in Manitou Springs at Queens Canyon. The Rainbow Falls catch basins are maintained and cleaned out. El Paso County is in the process of decommissioning the catch basins but will leave in place in case of future flooding.

Identify High-Threat Properties that may be Relocated or Purchased

-El Paso County has purchased, acquired, removed and completed the process of 3 potential high-risk properties resulting from damaging floods. The newly empty lots are now open space.

Channel Stabilization, Improvement, and Restoration in Fountain Creek

-Multiple projects from the 2013 and 2015 floods have been completed. Riverside Trailer Park site restoration and streambank work, along with the Willow Springs Pond project remain in progress.

Increase Use of Weather Radio Announcements

- PPROEM and Public Information Office work closely with the National Weather Service for the delivery of severe weather situation announcements.

Increase Municipalities That Meet Criteria of Storm Ready or Weather Ambassador Programs

-The City of Fountain has purchased new weather radios and are placed in various locations at City Hall to ensure employees are notified of inclement weather. Manitou Springs has a siren installed and uses Everbridge as a backup system. El Paso County can use Everbridge and local media as a warning system. Weather spotter classes are held annually for the public to increase awareness for severe weather notification. EPC is currently working with NWS for "weather ready" designation for the county.

Ensure Runway Safety Zones are Considered During Community Planning

-This is an ongoing project. Safety zones are considered for new construction along runways by the airport. Pikes Peak Regional Building Department has codes in place to ensure these are met.

Establish Severe Weather Protective Areas

-This is an ongoing project. Protective shelters are in most of the parks and open spaces in the Pikes Peak Region. Safety is a priority and early warning is the primary goal.

Provide Education to First Responders to Minimize Effects of Disease on Response Capability

-This is addressed in the 2018 El Paso County Public Health Pandemic Disease Plan.

Establish More Robust Vaccination Program

-The El Paso County Public Health Department has a robust annual back to school immunization program as well as a seasonal influenza campaign. El Paso County Public Health also assists with specific vaccinations after disasters for affected populations.

Colorado Springs

Wildland-Urban Interface (WUI) action

- Formally define the WUI as a different mapped polygon from the Hillside overlay area. Make this distinction clear in the locally adopted codes and information materials.

Wildfire Mitigation Education and Outreach to Neighborhoods at Risk

- Continue conducting wildfire presentations to neighborhoods in order to educate them on mitigation concepts. One consideration for project prioritization is based on the receptiveness of the community.

Wildfire Mitigation Fuel Reduction Activities

- Continue fuels reduction activities to include neighborhood chipping, creating defensible space around homes using residential stipends, prescribed burning in remote areas, and hazard fuel reduction projects in common areas and open spaces.

Wildfire Mitigation) Outreach to the Business Community

- Expand Business Education and Outreach about wildfire concerns, evacuation, and business continuity. Continue integration with the DFM's current efforts focused on businesses and healthcare facilities. Explore expanding outreach to adopt an all-hazards perspective in partnership with OEM.

Enhance WHINFOE Risk Model

- Enhance the Wildfire Hazard Information Extraction (WHINFOE) risk model to include adjacency of structures and urban conflagration potential.

Templeton Gap Floodway Accreditation

- Obtain documentation regarding the floodway's accreditation status from the U.S. Army Corps of Engineers and the Federal Emergency Management Agency (FEMA). Determine if the City should seek accreditation.

Assess Flood Risk for Critical Populations

- Assess the risk for facilities with critical populations (schools, nursing homes, etc.). Consider the need for site-specific Emergency Action Plans (EAPs) for locations.

Educate Critical Populations of Flood Risk

- Educate critical populations (schools, nursing homes, etc.) of their flood risk and the need to take safety measures. The second step is to assess the risk for critical facilities.

Address Erosion and Sloughing on Stream Banks

- Evaluate additional feasible and functional ways to reduce or eliminate erosion and sloughing on stream banks. Include long-term maintenance considerations in the evaluation.

Mitigation on Non-Burn Scar Streams

- Implement mitigation actions on non-burn scar streams including in-channel improvements for stability, detention, and zero run-off increase from new development.

Burial of Utilities

- Continue to bury utilities underground as feasible.

Tree Trimming and Vegetation Management

- Continue to trim trees and vegetation along power line corridors and infrastructure. Evaluate whether the City can support vegetation trimming via cost-sharing methods.

Severe Weather Public Outreach and Education

- Provide more information and outreach to the public on hazardous weather risks and mitigation actions so they can better protect themselves and property.

Evaluate Need for Severe Weather Protection in Design Criteria

- Influence building codes to mitigate for severe weather. Evaluate whether certain roof types could be required to mitigate the impacts of hail and damaging winds.

Public Messaging to Avoid Hazardous Areas

- Utilize variable message signs for use at key locations to warn motorists of hazardous areas.

Landslide Monitoring

- The City should proactively monitor landslides with Global Positioning System (GPS), pendulum technology, or other appropriate engineering monitoring system.

Landslide/Earthquake Outreach and Education

- Provide outreach to the public on landslide/earthquake risk and mitigation actions they can take to protect themselves and their property.

Landslide City Codes and Design Criteria

- Evaluate the need to modify city codes and design criteria for landslide susceptible locations within the city limits. Modify and enforce landslide mitigation requirements and work to ensure against building in areas identified as at-risk to landslides.

Subsidence

- Gather and analyze information on subsidence for integration into the 2021 Hazard Mitigation Plan.

Terrorism Public Awareness

- Continue Public Awareness on terrorism risk:
    - Promote public awareness campaign of shared responsibility and how the public should notify law enforcement ofsuspicious behavior ("See something, Saysomething")
    - Sustain capability to use the Integrated Public Alert and Warning System (IPAWS)
    - Continue support of Civil-Military Emergency ManagementCollaborative.

Collaboration to Address Terrorism Risk

- Enhance collaboration and coordination among Law Enforcement, Emergency Management and other intelligence- gathering agencies to address terrorism threats.
    - Increase participation in monthly Regional Threat Working Group meetings with the Colorado Information Analysis Center (CIAC) which are focused on terrorist/criminal threat. Colorado Springs Utilities also has a monthly meeting.
    - Coordinate with Colorado Division of Homeland Security and Emergency Management (DHSEM) security representative.

Hazardous Materials Readiness and Warning Capabilities

- Continue improving readiness and warning to appropriate officials and public for potential HAZMAT incidents for public safety and to reduce secondary impacts
    - Sustain capability of using IPAWSfor public warning
    - Continue to plan HAZMAT exercises
    - Prepare pre-scripted messages for IPAWS
    - Consider ways to quickly inform public. Work with media

Sustain Tier II Reporting

- Sustain Tier II facility reporting using the Hazardous Materials Management and Emergency Reporting System (HAMMERS).

Coordination with Railroad on Hazardous Materials Incidents

- Continue to coordinate with the railroad industry to improve collaboration and response in case of a large HAZMAT incident.

Fountain

Put Flood Information on the City Website

-During flood season this info can be found on City Council minutes; the City has chosen not to put on their website

Flood Information Handouts at City Hall

-Supplies are present at City Hall

Put Flood Information in the Local Paper: seasonal

-During flood season this is completed or when changes are made from hazard reports

Map and Assess Community Vulnerability to Seismic Hazards

-In progress; City GIS working with city agencies; some have copies of GIS products

Coordinate Conservation and Mitigation Actions with the Water Department

-City Water has put in smart meters and completed water mitigation efforts against chemicals.

Conduct Lightning Awareness

-Annual training for all city employees established and is required

Protect Critical infrastructure from Lightning Strikes

-All panels have been changed out to be lightning-resistant and surge protected; IT as well

Coordinate Flood Mitigation with City Drainage Plans

-City engineer dispatched to ensure no flood issues are involved prior to project starts

Tornado Plans and Drills for Public Buildings

-Tornado and Fire drills held annually for all public buildings; part CIRSA

Develop Community Wildland Fire Protection Plan

-Plan being worked by City Fire

Develop Wildland Fire Interface Code

-City Fire Department is developing the code

Participate in Local Emergency Planning Committee

-Regional Hazard Mitigation Plan Stakeholder Meeting (Feb 2020), Recovery/Damage Assessment/Debris Management Plans: participated in stakeholder meetings with regional partners from Jan-Feb 2020)

Expand Vaccination Program

-All City field workers get Tetanus/Hep/Influenza vaccines free of charge annually

Meet Criteria for Storm Ready Community

-City engineering considers these requirements prior to project start

Develop a Coordinated Response Plan for Acts of Violence

-City leadership exercises annually

Develop Coordinated Rapid Response to Aircraft Incidents

-City Police and Fire developing plans to support coordinated response

Conduct Annual Review and Tri-annual Update of the Fountain EOP

-Executed; awaiting inputs from County plan for latest

Calhan/Ramah

Community Outreach

- Review actions that may be taken in case of weather related emergencies to include notes on utility bills, fliers throughout town and public meetings that will be scheduled later in the year. Weather related hazards are the most prevalent in our areas.

Wastewater/Stormwater System Improvements

- Water and sewer system improvements to alleviate any security issues and to lessen the likelihood of accidents. The sewer lagoons fencing will be re-enforced and new locks installed. Water tanks and pump houses will be re-done for the chlorine systems and increased security.

Storm drain improvements

- Street infrastructure to be improved regarding drainage. This will help with flooding issues. Grants will be sought to add drainage plans to all main roads.

Hazardous Weather Shelter Designations

- Designate areas that can be used for shelters for tornadoes. The Town of Calhan has a list, but it needs to be updated.
-

Calhan: EOP Update

- Update the Local Emergency Operations Plan in conjunction with the Fire Department. Contact the Fire Chief and set up meeting with the board of Trustees and the Fire Chief before the end of 2020.

Vulnerable Population List

- Get list of vulnerable population so some type of phone tree can be set up to check on individuals in the event of an emergency. There are quite a few elderly citizens that may live alone in both Calhan and Ramah.

Calhan: Historic and Cultural Development

- Create an assessment of historic and cultural landmarks; form a historic preservation commission to preserve and protect Calhan's heritage.

Parks and Recreation Improvements

- Maintain and protect the town's special and natural features, open space, and watershed areas; collaborate with local governments in the Pikes Peak Region to protect the areas major attractions: Paint Mines, Big Sandy Creek, and Ramah Reservoir. Encourage new development to protect terrain and preserve significant vegetation, scenic views, and incorporate natural trees and shrubs into landscape plans. Update town codes and ordinances to protect sensitive natural areas and open spaces.

Land Use and Growth Management

- Provide for the orderly growth of the town to be consistent with the community vision; Implement floodplain management; Increase coordination within the Pikes Peak Region, regarding growth and development using IGAs

Community Infrastructure and Public Facilities

- Ensure that future growth and development does not exceed the capabilities of public services and facilities; Develop an urban growth area map; Inventory utility boundaries and locations; Implement traffic control and planning techniques that protect the small town character; Improve safety for pedestrians along U.S. Highway 24; Improve the overall appearance and condition of the existing infrastructure; Improve the surface conditions and drainage of all roads

Palmer Lake

Joint Evacuation Drill

- Police Department will do a Joint Evacuation Drill on September 24, 2020 (barring COVID)

Permitting staff addition

- Town of Palmer Lake (TOPL) hired an MS4 consultant as we must now be permitted.

Join Colorado Storm Council

- TOPL joined Colorado Storm Council

Ordinances Created

- Created new "Illicit Discharge" and "Construction" Ordinances.

Co-create public awareness ads for floodplain management

- TOPL will join Colorado Springs in Public Awareness ads concerning drainage, discharge, etc.

Manitou Springs

Floodplain Mapping Update

- Planning Department is participating in the El Paso County Discovery project to identify priority areas for updated floodplain mapping. (Improve data on flood risk and vulnerability)

Public Works Office Remodel

- Remodel Public Works offices to include new space for the City's Emergency Management Function. Both our Fire Department and City Hall are located in the floodplain, so this will prevent loss of operations/emergency management during flood events.

Defensible Space Development

- Develop/maintain a defensible space for the south side of the City – dedicate staff time to identifying grant funds and approach, and additional analysis on where to concentrate our efforts.

Wildfire Protection Plan Implentation

- Implement actions from City's Community Wildfire Protection Plan – dedicate staff capacity to implement. Focus on public education and mitigation workshops.

Community Rating System Program Support

- The City of Manitou Springs currently participates in the CRS program and will strive to reduce specific risk and vulnerabilities via federal, state, and local best practices.

Downtown Flood Mitigation Program

- Program focuses on flood mitigation techniques for downtown property owners; city staff will explore possible funding and programmatic approaches for continued support.

City Hazard Mitigation Plan Update

- The City of Manitou Springs will submit a grant application in early 2021 for a 2022 HMP plan update

Conduct Annual Review and Update of the City of Manitou Springs Emergency Operations Plan

- This is in progress for 2020. Waiting Department Head input and will schedule for City Council review.

Perform Continuity of Operations Planning

- Continuity of Operations Plan was updated by Department in February of 2020.

Conduct Training to Certify Fire Department Personnel in Wildland Operations

- This an ongoing process. Annual training and refresher provided to firefighters, includes completion of arduous fit test. Completed for season 2020.

Adopt Fire Adaptive Community Standards and Practices

- Community Standards (Zoning Code and Subdivision Regulations) are addressed in the Plan Manitou Hazard Mitigation Plan. These standards are referenced to NFPA Standards or the 2015 IWUIC where appropriate. Plan Manitou Hazard Mitigation Plan was reviewed and approved by City Council.

Monument

MOU with D38 for Use of Their Facilities if Needed

- Working with LPSD to find out if an IGA/MOU is in place if not I have been given the directive to establish one.

Add a Link to the Town Website "Emergency Preparedness"

- Working with our website representative to re-organize and add “emergency preparedness” to our website

Adopt Emergency Operations Plan and Pre-Disaster Mitigation Plan

- Working off 2012 Plan with the intent to update

Enhance Use of Emergency Notification System within the Town

- We utilize reverse 911 and our social media platforms along with website. (Chief is researching other opportunities such as code red for the future)

GMF

Install Cell Phone Tower Within Town

-This has not happened and is unlikely to soon w/o interested cellular providers. Town Staff has explored this as an option, and the amount of business (low ROI) for providers in GMF makes it unlikely that they will invest in the installation of additional cell tower(s).

Work with Property Owners to Mitigate Wildfire Risks to Property

-The Town’s Board of Trustees created a Fire Mitigation Committee. The Committee is working with CUSP, Colorado Department of Forestry, and CSU on Fire Mitigation efforts. A generous local benefactor has also helped fund some Fire Mitigation efforts in and around Town. CUSP has provided public education services and conducted assessments of Citizen properties at the request of Citizens who are interested in Fire Mitigation on their own properties. Our Community identified Fire Mitigation as a top priority in our 2019 Comprehensive Plan. The Fire Mitigation Committee and Town Manager have submitted a 5-year “Healthy Forests Plan,” which is a grant request to the Kirckpatrick Family Fund for their consideration. Other funding sources for Fire Mitigation are needed, and the Town is searching for them.

Update Town Website with Emergency Information

-Information is current on the Town website, and has been re-evaluated during the Summer of 2020. Website is live in July 2020, with a more user-friendly version of the Town’s website up and running.

Mitigating Flood Debris on Green Mountain Falls Property

-Previous debris removal from 2018 rain events is complete. Preparing for bridge repairs to include contract awards for 2-3 bridges.

Manitou Springs: 17 Additional Mitigation Actions from City's HMP

Initiative	Description	Hazard(s) Mitigated	Status of Action	Status Description	Priority	Cost	Lead & Support Agency	Timeframe	Alignment with goals and Objectives
Initiative #___: Floodplain Management and Permitting	Develop a stronger floodplain management program and regulations beyond the State's minimum requirements. Begin by forming workgroup; evaluating programs in other small communities; and assigning staff capacity for CFM training.	Flood	Not started	Some CRS responsibilities shifted from PPRBD to City. Planning staff will begin by assessing/evaluating participation in CRS program.	High	Medium	Planning Department	Long-term	Goal: Objectives:
Initiative #___: Building Code Enforcement	Expand code enforcement capabilities as resources allow, with the goal of increasing building code enforcement capability.	All	Not started	Financial constraint from public health emergency; consider alternate approaches.	Mediu m	High	Planning Department/ Police Department	Medium-term	Goal: Objectives:
Initiative #___: Floodplain compliance incentives	Develop a strategy and incentives to bring private commercial and residential structures into compliance with state and federal floodplain standards. Decrease vulnerability of existing structures in floodplain.	Flood	Not started	This is challenging because owners may not have additional resources, and there are few examples of this in our region.	Low	High	Planning Department	Long-term	Goal: Objectives:
Initiative #___: Historic Building upgrades	Identify funding sources for low-interest loans to owners of historic structures to address hazard vulnerabilities, primary flood.	All	Not started	This program would require staff capacity and some outside resources.	Low	High	Planning Department	Medium-term	Goal: Objectives:
Initiative #___: Provide financial support for structural flood mitigation for private properties	Develop a package of funding mechanisms for seed money to fund flood mitigation projects.	Flood	Not started	Capacity needed to pursue FEMA and other grant sources.	Low	Medium	Planning Department	Medium	Goal: Objectives:
Initiative #___: Acquire easements or right-of-ways of creeks.	Property along creeks is mostly privately held, which poses challenges for maintenance and restoration. Consider doing	Flood	Not started	City needs to better understand legal framework and maintenance costs.	Low	High	Planning Department	Long-term	Goal: Objectives:

	this in key locations as part of Creek walk trail.								
Initiative #__: GIS Data System & capability improvements	Improve GIS data, analysis capabilities, and maps for hazard and risk information for City decision-making and public education.	All	Ongoing	Improved data for wildfire and geologic hazards. Discovery project will improve floodplain data.	Mediu m	Low	Planning Department/ Public Works Department	Short-term	Goal: Objectives:
Initiative #___: Assess vulnerability of structures along Fountain Creek.	Housing and historic/cultural properties are at risk and in need to repair/structural improvements. Suggest a 2-phase approach to identify priorities.	Flood	Not started	Potentially move forward in 2021, if available staff capacity.	Mediu m	Medium	Planning Department	Phase 1: Short-term, Phase 2: Medium-term	Goal: Objectives:
Initiative #___: Establish a procedure for structural evaluation and enforcement post-disaster.	Following 2013 flooding, some structures were posted "uninhabitable," but City did not have mechanism to enforce requirement to vacate.	All	Not started	Limited budget for consultant services is required.	Low	Low	Planning Department	Medium-term	Goal: Objectives:
Initiative #___: CDOT collaboration to mitigate roadway issues	Coordinate with CDOT to promote and support mitigation of slope failure, rockfall, drainage, and erosion issues along US Highway 24.	Flood, geologic	Not started	Identify staff capacity to initiate outreach with CDOT. Potential range of funding sources to assist.	Mediu m	Medium	Public Works	Short-term	Goal: Objectives:
Initiative #___: work with CSU to Identify vulnerabilities and Improvements to overhead Electrical Infrastructure	Work with Colorado Springs Utilities to identify vulnerabilities and needed improvements in the electrical system and to improve coordination on the tree trimming program to protect power lines.	All	Not started	Identify staff capacity to initiate outreach with CDOT.	Low	Medium	Public Works	Medium	Goal: Objectives:
Initiative #___:	Address hazard-related ingress/egress issues on City's west side at US Highway 24 Business and Serpentine Drive, to ensure it is functional during flood and wildfire events.	All	In Progress	City is currently assessing infrastructure and maintenance needs within this corridor.	Low	High	Public Works Department/ Planning Department	Long-term	Goal: Objectives:
Initiative #___: Implement Englemann Canyon pilot project.	Wildfire and subsequent flood/debris flow in Englemann (Ruxton) Canyon is a worst case scenario for City. In 2015, Hazard	Wildfire	Not started	Capacity and specific expertise would be required to manage this complex project.	Mediu m	High	Public Works	Short-term	Goal: Objectives:

	Mitigation team pursued CDBG-DR watershed funding for fuels reduction and flood mitigation.								
Initiative #___: Conduct an inventory of retaining walls that support vehicular right-of-ways.	Retaining walls (some historic) are vulnerable to failure along Fountain Creek, Ruxton Creek, Serpentine Avenue, Spencer Avenue, Highway 24 at Crystal Hills Boulevard, and other roadways.	Geologic	Not started	Potential information may be obtained from Ruxton Avenue survey.	Low	Medium	Public Works Department	Long-term	Goal: Objectives:
Initiative __ - Public Facilities and parks mitigation	Assess vulnerability of public facilities and parks located in the 1% chance floodplain and prioritize mitigation opportunities.	Flood	Ongoing	Staff will consider addressing this in Parks and Facilities Master Plan.	Mediu m	Medium	Public Works Department	Medium-term	Goal: Objectives:
Initiative #____: Update and improve household preparedness communication and outreach program.	The City needs to inform and educate residents, business owners, and visitors about hazard risks, vulnerabilities, mitigation, and preparedness. This action supports development of a comprehensive Communications Plan that would also incorporate vulnerable populations.	All	Ongoing	In 2020, Public Information Officer updated City's Hazard Preparedness/Mitigation website and launched updated messaging.	High	Low	Public Information Officer, with input from Planning and Fire Departments	Ongoing	Goal: Objectives
Initiative #___: Update flash flood awareness campaign.	Flash flooding is a life safety concern, and residents in City's downtown may be unaware of risk.	Flood	Ongoing	Consider both printed and online communications.	High	Low	Public Information Officer, with input from Planning and Fire Departments	Ongoing	Goal: Objectives

From:	Schaub, Michael P
To:	angelld@co.teller.co.us; tmjohnso@dcsheriff.net; dschnacken@dcsheriff.net; Alex.Jakubowski@elbertcounty-co.gov; mykel.kroll@fremontco.com; LCPH_3office@lincolncountyco.us; mears@co.pueblo.co.us; bradleyc@pueblocounty.us
Cc:	Weinstein, Laura; Kuechenmeister, Anne
Subject:	EXTERNAL: PPROEM Hazard Mitigation Plan - Request for Review by Friday COB
Date:	Wednesday, December 2, 2020 12:56:33 PM

Fellow County Emergency Management Personnel:

I am the project manager for our Hazard Mitigation Plan rewrite. **I respectfully request you take a look at the Pikes Peak Regional Office of Emergency Management draft HMP by this Friday, COB**. Link is below along with a quick survey that we'd like you to participate in. Any comments/suggestions you might have are greatly appreciated. The key chapters that we'd like your comments on are:

- Chapter 3 – Regional Profile and Capabilities
- Chapter 5 – Mitigation Strategies

Thank you for your time and please let me know if you have any questions!

Mike Schaub
PPROEM Recovery Manager

1. Link to HMP Draft: https://hazardmit.wixsite.com/website
2. Link to Survey on Community Goals, Assets, and Actions: https://forms.gle/17QpeYcSNFuBoRg3A

MEDIA RELEASE
October 7, 2020

FOR MORE INFORMATION
Kim Melchor
City of Colorado Springs Communications
(719) 385-5248

Natalie Sosa
El Paso County Public Information
(719) 520-6250

Public invited to comment on final draft of hazard mitigation plan for Pikes Peak Region

Plan identifies local hazards, develops strategies to reduce risk and impact of disasters

COLORADO SPRINGS, Colo. — The Pikes Peak Regional Office of Emergency Management (PPROEM) has completed the final draft of the El Paso County Multi-Hazard Mitigation Plan and invites the public to comment of the plan through Oct 21.

The public may submit their comments through an online form or by mailing/hand delivering their comments to the Pikes Peak Regional Office of Emergency Office. In July, the public was invited to provide input to the plan update. The plan continues efforts to identify, assess, and prioritize goals and actions for mitigating the effects of natural and human-caused hazards in El Paso County.

The survey will:

- Help emergency managers learn more about the public's perceptions and opinions regarding hazards in the community
- Identify preferred methods and techniques for reducing the risks and losses associated with each hazard.
- Improve public/private coordination, mitigation, and risk reduction efforts in El Paso County

"We count on our citizens' input to help improve mitigation efforts and reduce the risk of disaster in El Paso County. Developing a mitigation plan that addresses the unique needs of our community helps to break the cycle of rebuilding after a disaster, only to have repeated damage in the future. It also provides a framework for developing feasible and cost-effective projects that could prevent future damage," said Mike

Schaub, Recovery and Mitigation Manager, Pikes Peak Regional Office of Emergency Management.

A requirement for many communities, the Multi-Hazard Mitigation Plan serves to identify natural and human-caused disasters that may impact the community. Mitigating local hazards can help reduce or eliminate the risk of loss of life, injury, and/or property damage. Thus, aiming to reduce the likelihood that a hazard will result in a disaster. Examples of natural human-caused hazards include wildfire, hail, flood, drought, winter storms, earthquake, landslide, extreme acts of violence, pandemic, or hazardous material spills.

This plan updates and consolidates the 2015 El Paso County Multi-Jurisdictional Hazard Mitigation Plan and the 2016 City of Colorado Springs Hazard Mitigation Plan to include El Paso County, the City of Colorado Springs, and the jurisdictions within El Paso County. It is prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to achieve eligibility for FEMA Hazard Mitigation Grant Programs (HMGP) including:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Severe Repetitive Loss (SRL)
- Repetitive Flood Claim (RFC)

Residents are encourage to learn more about the Hazard Mitigation Plan and the update process.

In accordance with the Americans with Disabilities Act of 1990 ("ADA"), the Pikes Peak Regional Office of Emergency Management will not discriminate against individuals with disabilities. Anyone requiring assistance to view the plan or provide comments should make the request to the Pikes Peak Regional Office of Emergency Management at mailto:michael.schaub@coloradosprings.gov, or by calling 719-203-0555.

###

9News <newsroom@9news.com>; Andrea Chalfin (andrea@krccnews.org); Angela Leath <AngelaLeath@elpasoco.com>; BIke COS <comm@bikecoloradosprings.org>; Bill Folsom <bfolsom@koaa.com>; bobby.irwin@cumulus.com; Brianna Goodwin- Sports Corp <brianna@thesportscorp.org>; Bryan Grossman- CS Indy <bryan@csindy.com>; business@denverpost.com; businessnews@gazette.com; carlotta.olson@gazette.com; Chuck Broerman <ChuckBroerman@elpasoco.com>; CityCouncil@coloradosprings.gov; citydesk@gazette.com; Communications Department <CommDept@coloradosprings.gov>; Craig Blewitt <cblewitt@springsgov.com>; CS Indy- News <news@csindy.com>; Dan Boyce- Colo Public Radio <dboyce@cprmail.org>; Daniel Rodriguez- Sports Corp <daniel@ppihc.com>; denver@bizjournals.com; desk@9news.com; Donna Nelson <dznelson@springsgov.com>; Doug Martin-Sports Corp <doug@thesportscorp.org>; editor@pikespeakpublishing.com; editorial@csbj.com; Elaine Sheridan <elaine@koaa.com>; Everton Media Group <alegroupmarket@gmail.com>; Fabos, Jamie <Jamie.Fabos@coloradosprings.gov>; Fox21 News <news@fox21news.com>; Greg Dingrando (gregd@pprbd.org); info@africanamericanvoice.net; info@krcc.org; info@southsidebusiness.com; Jakob Rodgers <jakob.rodgers@gmail.com>; James Thompson- OWN <thompson.jamesii@gmail.com>; james.tucker@africanamericanvoice.net; janderson@ap.org; Jay Anderson <janderson@springsgov.com>; Jeff Dunn <jdunn@springsgov.com>; Jeff Greene <jhgreene@springsgov.com>; jim.arthur@cumulus.com; Joel Navarro <joelnavarro@totaltraffic.com>; jweiss@csindy.com; Kara Mason-Pueblo Pulp <kmason@pueblopulp.com>; Karen Palus <kpalus@springsgov.com>; KBIQ <bret.stevens@salemcos.com>; kcncnews@cbs.com; keithcoffman@lycos.com ; Kim King <kking@springsgov.com>; KKTV News <news@kktv.com>; KOAA News <news@koaa.com>; Kozel, Sydney <Sydney.Kozel@coloradosprings.gov>; KRDO News <krdonews@krdo.com>; KRDO Radio News <radionews@krdo.com>; Kristina Iodice <kristinaiodice@elpasoco.com>; Kurt Schroeder <kschroeder@springsgov.com>; Kyle Harrris- Colorado Independent <kyle@coloradoindependent.com>; La Voz Colorado <news@lavozcolorado.com>; Landers, Laurie <Laurie.Landers@coloradosprings.gov>; Laurel-downtown partnershp <Laurel@downtowncs.com>; linda.navarro@gazette.com; linduval@comcast.net; Liz Haltiwanger <lhaltiwanger@kktv.com>; lmckinney@cscono.org; Maria Parmigiani-Fox Lifestyle show <mparmigiani@kxrm.com>; Marianne-Cumulus Radio <Marianne.fields@cumulus.com>; Mary Shinn <Mary.shinn@gazette.com>; Marylou@newfalconherald.com; McDaniel, Charae <Charae.McDaniel@coloradosprings.gov>; McDowell, Maren <Maren.McDowell@coloradosprings.gov>; Megan- Sports Corp <megan@thesportscorp.org>; megan@ppihc.org; Mia Atkins-Fox Lifestyle Show <matkins@kxrm.com>; michelle@newfalconherald.com; Mike Chaves <mchaves@springsgov.com>; Mike Lewis <m.lewis@krdo.com>; Mike Sullivan <msullivan@springsgov.com>; Natalie Sosa <NatalieSosa@elpasoco.com>; Nathan Van Dyne <nathan.vandyne@gazette.com>; News Denver Channel <newstips@thedenverchannel.com>; news@denvernewshd.com; news@epcan.com ; news@krcc.org; news@kvor.com; news@kxrm.com; news@pikespeakpublishing.com; newspeakmag@gmail.com; newsroom@850koa.com; newsroom@denverpost.com; Nia Bender-KVOR <niabender@gmail.com>; Niski, Vincent B <Vincent.Niski@coloradosprings.gov>; noblitst@ci.colospgs.co.us; Old Colorado City Magazine <occliving.bvm@gmail.com>; pbanda@ap.org; PP United Way <cindy@ppunitedway.org>; PPRCN@springsgov.com ; psa@krcc.org; Regan@CS Indy <Regan@CSIndy.com>; rich.laden@gazette.com; richard@kvor.com; routon@csindy.com; Ryan Parsell-EPC <ryanparsell@elpasoco.com>; Sarah Johnson <sbjohnson@springsgov.com>; Sarah Weisfeldt-CNN <Sara.Weisfeldt@turner.com>; Scott at Complete Colorado.com <scott@completecolorado.com>;

scribe@uccs.edu ; Seth Boster (seth.boster@gazette.com); Sharon.hogg@ppcc.edu; shayne@ppunitedway.org; stephanie.sanchez@unitedwaydenver.org; stevejordahl@q.com; Susan Davies <susan@trailsandopenspaces.org>; taylormillard@iheartmedia.com (taylormillard@iheartmedia.com); Ted Collas <tcollas@springsgov.com>; The Colorado Sun <tamara@coloradosun.com>; Tommy Schield <tschield@usopm.org>; traffic and weather <denverdesk@ttwnetwork.com>; Veronica@ColoradoCatholicHerald.com; wayneh@gazette.com; Web Team <webteam@springsgov.com>; Zach Hillstorm <zach@csindy.com>; zubeck@csindy.com

Dave Betzler: 4710 Sandstone Drive Monument; 719-205-7651; betzler13@gmail.com; *10/11/2020*

COMMENTS *(comments/changes in red)*

2.2 Planning Process; Element A: Planning Process; *Step 1: Organize to Prepare the Plan* : PPROEM contracted with Michael Baker International (MBI) and Forsgren Associates (the Planning Team, the Team) to guide and facilitate the planning process and assemble the Multi-Jurisdictional Multi-Hazard Mitigation Plan. The plan update preparation process included: coordination with local, state, and federal agencies and organizations; specific and relevant information from multiple sources and stakeholders; and analysis and review of document drafts to help inform the overall plan update.

Table of Contents; 3.1.25 Palmer Lake

CHAPTER 3 Region Profile/Capability Assessment; This chapter provides a general description of the Pikes Peak Region, including geography, climate, history, population, economy, critical facilities, and governments. It also contains a capability assessment outlining the existing programs, policies, and plans that mitigate or could be used to mitigate risk of natural hazards.

3.1 Pikes Peak Region Profile: A new, collaborative emergency management office oversees efforts across the Pikes Peak Region that includes both unincorporated El Paso County and the City of Colorado Springs.

3.1.1. Historical Overview. El Paso County's initial growth was driven by a search for gold during the period 1858 - 1917. The national build-up during World War II resulted in the establishment of Fort Carson on 137,000 acres to the south of Colorado Springs, and the region's military presence expanded further in the 1950's with the opening of the U.S. Air Force Academy. In September 1957, the US and Canada formally agreed to create the bi-national North American Aerospace Defense Command within Cheyenne Mountain. . . .

The 1985 establishment of the United States Space Command at Peterson AFB soon resulted in the development and rapid growth of a commercial space industry. With this industry . . .

El Paso County is a highly popular winter and summer recreation destination. It features extensive hiking and cycling trails, numerous creeks for fishing, . . .

3.1.3 CLIMATE Severe weather is commonplace in El Paso County: major thunder/lightning/hail storms resulting in extreme wildfires, extensive property damage, and flash flooding; frequent snowstorms with drifts and snowfall blocking transportation routes; and volatile tornadoes and high winds affecting the eastern part of the county. . . .
[NOTE: conduct global search/replace on "County" to ensure document consistency re capitalization]

The Western Regional Climate Center reports data from the Colorado Springs Municipal Airport weather station. [Delete "El Paso County"— repetitive]. Table 3-2 contains . . .

3.1.5 DEMOGRAPHICS Within the region's growing population, many individuals are at greater risk from hazard events because of age, limited physical or mental capabilities, living conditions, limited access to transportation and modern technologies. Frail elders, for example, may be more likely to require additional assistance. Research has . . .

3.1.7 AGE DISTRIBUTION COMMENTS: 1) Introductory wording (similar to that in para immediately above Figure 3-4) is necessary to describe significance of Figure 3-4, especially the senior population. For example (from Fig 3-4), it appears the 60-85+ cohort is roughly 126,000: approximately 17.5% of total population of 720,000. Important to contrast/compare this with Colorado as a state, and with other counties. PPACG AAA can verify, but I believe El Paso County has the largest number of seniors, and the largest number over 85 statewide. 2) A large military population means that of necessity, many military members will be deployed at any given time, year-round. It also means that remaining families (generally young spouses and infant children) may be somewhat less capable and prepared for natural disasters and hazardous conditions, and may require rapid emergency assistance.

3.1.9. ETHNIC POPULATION. Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Unless well-designed and planned, post-disaster recovery efforts can be ineffective and exhibit cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poor living conditions can compound their vulnerability and heighten risk from natural disasters. According to the . . .

3.1.10. ECONOMY. COMMENTS: Similar to Age Distribution comments above, suggest short description highlighting significance of Table 3-5. For Example, poverty levels are significantly higher in southern Colorado Springs, Fountain and Manitou Springs. What's the impact for/on emergency management (planners, response, resources, etc?)

3.1.17. STATE AND REGIONAL. ***Colorado Division of Homeland Security and Emergency Management*** The mission of Colorado's Homeland Security and Emergency Management Division is as follows: support the needs of local government and partner . . . [*Delete following*: "The Mission of the Division of Homeland Security and Emergency Management is

Colorado Geological Survey The Colorado Geological Survey (CGS) is an agency within , , ,

Colorado State Forest Service The mission of the Colorado State Forest Service (CSFS)

Code Enforcement The Development Services Department, Code Enforcement Officers enforce the El Paso County Land Development Code. Depending upon the type of violation, enforcement staff contact . . .

El Paso County Public Services Department, Facilities Management: Within the Department, the Engineering and the Operations Divisions manage county facilities. Engineering's Infrastructure Plannng Section . . .

- **Pikes Peak Office of Emergency Management (PPROEM):** COMMENT: Suggest expanding to include reference to emergency preparedness, CERT training, exercises/evacuation planning, etc.

- **HAZMAT:** The PPROEM HAZMAT Team coordinates hazardous materials responses within the unincorporated portions of El Paso County, as the BOCC [expand acronym]

- **Security:** The mission of Security and Parking Operations is to protect . . .

El Paso County Community Wildfire Protection Plan, 2001 COMMENT: fix date discrepancy 2011 / 2010

El Paso County Sheriff's Office, Emergency Services Division. This Division is responsible for coordinating . . . In fulfilment of statutory responsibilities, the Division oversees the El Paso County Search and Rescue, . . .

3.1.20. CITY OF COLORADO SPRINGS, ***Colorado Springs Utilities Strategic Plan (2020)*** The strategic plan guides the Utilities Board which has primary and ultimate responsibility for ensuring the benefits of local ownership . . .

focus of the strategic plan is stated as "The Utilities Board is primarily and ultimately accountable for ensuring the benefits of local ownership and control to the . . .

Police The Colorado Springs Police Department (CSPD) consists of three bureaus, each with multiple divisions, sections and units. The Patrol Bureau, Operations Support Bureau and the Investigative and Special Operations Bureau all report to the Office of the Chief of Police.

3.1.23. CITY OF MANITOU SPRINGS.***Plan Manitou – Community Master Plan & Hazard Mitigation Plan, 2017.***

To mitigate future potential disasters, a Hazard Mitigation Steering Committee (a subgroup of the HMP Team) developed a Natural Hazard Mitigation Strategy that includes 37 mitigation actions. Ten high priority actions were identified:

3.1.25. TOWN OF PALMER LAKE

3.2 HAZARD MITIGATION CAPABILITIES ASSESSMENT

The capability assessment conducted by the planning team included an inventory and analysis of existing authorities and capabilities. The assessment created an inventory of an agency's mission, . . .

3.3 CRITICAL FACILITIES, HIGH POTENTIAL LOSS FACILITIES (etc)

COMMENT: Given the region's large and growing over 60 population, and the region's attractiveness as a retirement area, recommend consideration of our large number of senior residences (primarily assisted, dementia) as 'critical' or maybe even vulnerable facilities. NOTE: contact PPACG Area Agency on Aging/Jody Barker.

CHAPTER 4 HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)

4.1.1 EARTHQUAKE AND FLOOD – HJAZUS-MH ***Overview;*** HAZUS-MH is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. HAZUS-MH simulates earthquake and flood events and the impacts that would be generated . . .

4.6.2.3 VULNERABILITY, **Magnitude / Severity**, Catastrophic: If a dam or levee was to fail, the impact could be . . .

Exposure and Losses, Population: Vulnerable populations are all populations downstream from dam and levee failures that are incapable of escaping the area within the allowable time frame. This includes the elderly, homeless, and children who may be unable . . .

Table 4-21: El Paso County Hail Event . . . COMMENT: U.S Air Force Academy/USAFA, Peterson AFB; Co Springs Airport (COS)

4.7.2.3 Vulnerability, Spatial Extent and Geographic Location, ***Drought:*** County residents receive water from a limited number of sources: primarily surface water (much of which is brought from outside of the region) and water districts that draw water from groundwater aquifers, but also including individual homeowner wells into groundwater aquifers.

Magnitude / Severity, ***Drought,*** **Limited:** Although no injuries or property damage are typically associated with drought, the loss of farmland and diminishing domestic water supply can be devastating to local economies.

Drought can have a widespread impact on the environment and the economy, depending upon its severity, although it typically does not result in loss of life or damage to property, as do other natural disasters. The National Drought Mitigation Center uses three categories to describe likely drought impacts: Agricultural – crops that rely on natural

precipitation. Water supply – communities, businesses and homeowners. Fire hazard – desiccated forests and rangelands

4.7.2.6 Future Condition Impacts, Future water use planning should consider increase in population as well as potential impacts of climate change. A 2006 report entitled "*Running on Empty? El Paso County Growth and the Denver Basin",* makes the following

4.7.2.7 Issues The planning team has identified the following drought and extreme heat related issues:

- Identification and development of alternative water supplies.
- Utilization of groundwater recharge techniques to stabilize the groundwater supply.
- The probability of increased drought frequencies and durations due to climate change.
- Exacerbated community and regional water supply problems due to lack of planning for long-term sustainability and by inefficient allocation of water property rights (Stiedmann, 2006).
- Deficient wise-water management policies, protective regulations and conservation activities even during non-drought conditions.
- Potential for Increased extreme heat events due to climate change.
- Ineffective development strategies to reduce "heat islands".

4.7.3.7 **Issues**, . . .include the following: Effective public education lightning hazard campaigns to reduce injuries and fatalities; Seasonal public service warnings re lightning strike threat and risk awareness

4.7.4.7. **Issues COMMENT:** For these and all bulletized sections throughout the document, be consistent—either all sentences, or all phrases.

4.9.1.2 Previous Occurrences. The Rampart Range Fault begins near Larkspur and continues south towards Colorado Springs, ending near Colorado Highway 24.

4.10 WILDFIRE

4.10.1.1 Definition and Extent, As shown in the El Paso County CWPP Vegetation Types Map, Figure 4-56 . . .The CWPP describes the dense forests of the western County as providing the heavy fuel loads that can sustain intense fires, and, to complicate matters, thousands of homes are located . . .

4.10.1.3 Vulnerability, Probability of Future Occurrence, Likely: This is due to limited fuels reduction and forest management, and the effects of climate change that may intensify fire-friendly weather conditions, as well as lengthen the season during which very large fires tend to spread (Kennedy, 2015).

- Issues. Area fire districts and local governments need to continue to exercise and train on WUI events and emergency evacuation. . . . Evaluate and designate emergency ingress / egress routes in WUI and in new land planned housing developments

4.11.2.3 Vulnerability, Spatial Extent and Geographic Location, COMMENT: Southern Poverty Law Center "objectivity" is increasingly suspect. Suggest simply noting that Colorado Springs, like virtually all major metropolitan areas, likely has a number of hate groups of varying ideological bent.

> Critical Facilities and Infrastructure, Attacks directed at utility facilities and infrastructure may cause disruption in services or lead to potential cascading events that may proportionately impact local or regional populations more than physical damage.

4.11.3.3 Vulnerability, Spatial Extent and Geographic Location; With a large number of major military facilities and extensive supporting network of sophisticated space and defense contractors, larger cities like Colorado Springs may be especially vulnerable to cyber-attacks.

Exposure and Losses, >Critical Facilities and Infrastructure, COMMENT: expand SCADA (Supervisory Control and Data Acquisition)

5. MITIGATION STRATEGY, GOALS AND OBJECTIVES, Goal 1, Objective 1.1: Assess and improve existing emergency notification systems to ensure . . . Goal 2, Objective 2.3: Collaborate with businesses in developing and maintaining Continuity of Operations Plans

5.3 MITIGATION ACTIONS, Mitigation actions were developed based on risk assessment-identified hazards, and actions were characterized as short or long-term and prioritized. This development process meets the intent of EMAP Standards . . .

6.3 LOCAL PLANNING COMMITTEE, COMMENT: LPC is a volunteer entity and "an advisory body". LPC's primary role should be to monitor Plan implementation and r*eport periodically to community governing boards and the public.* Plan implementation and maintenance are the responsibility of the originating organization(s) --PPROEM, not a volunteer group however experienced, dedicated and well-intentioned.

Hazard Mitigation Plan Comment Form

The Pikes Peak Regional Multi-Hazard Mitigation Plan Update is available for public review and comment. Public comments will be accepted during the public comment period from October 7 through October 21, 2020.

Please provide feedback below.

Name (optional)

Douglas Hagerman

Date (optional)

MM DD YYYY

10 / 08 / 2020

Address (optional)

3706 Lancashire St

Type feedback here.

Overall it is a good and comprehensive report. Two significant items need attention, the Templeton Gap Floodway and the railroad.

The map on page 4-40 shows the flood hazard from a high water condition in the floodway, not what would happen in the case of a levee failure. The purpose of the floodway is to protect a large section of downtown Colorado Springs from a rare, but possible large rain event, and the scale of such an event can be judged by reviewing floods that happened in the Shooks Run area before the levee was constructed. And it is evident from cursory examination that the floodway maintenance is marginal, with areas of significant vegetative growth in the levee itself, a poorly managed channel, and significant dumping of trash, tree limbs, etc. into the channel. A sudden large rainstorm and a levee failure could easily cause billions of dollars of damage.

The HAZMAT section points out the possibility of a rail accident, but the fact that such an accident could happen in the middle of downtown Colorado Springs is understated. It is notable that the southbound tracks coming down Monument Hill put a substantial braking load on the freight trains as they move through the city. Additionally, there is a very sharp turn just south of the power plant. Derailments have occurred there in the past. An accident involving a dozen crude oil cars and a fire would be devastating to the area.

Both of these cases need further attention.

Additionally, in the Mitigation Strategy chapter, it is notable that the possibility of evacuating people is not discussed in sufficient detail, even though that was a considerable problem even with the limited population involved in the wildfires near the Air Force Academy. A large evacuation to the east or to the west would suffer severe constraints.

Finally, there is no discussion of the organization and ongoing maintenance of a civil defense organization. For example, if it is necessary to coordinate a block-by-block activity, what personnel would be available and trained and equipped to manage such an operation? The city should re-constitute the previous civil defense organization so that the next time a wildfire or flood or train crash occurs, a system is in place to handle it. We have been lucky so far.

Thank you for your efforts!

Doug.

Hazard Mitigation Plan Comment Form

The Pikes Peak Regional Multi-Hazard Mitigation Plan Update is available for public review and comment. Public comments will be accepted during the public comment period from October 7 through October 21, 2020.

Please provide feedback below.

Name (optional)

Tina Brooks

Date (optional)

MM DD YYYY

10 / 11 / 2020

Address (optional)

2215 Ramsgate Terrace

Type feedback here.

I am the secretary for the Mountain Shadows Community Association and can be reached at 719-237-0234 or secretary@mscaweb.com:
Is your department aware of the Zoning Change for 2424 Garden of the Gods? They want to build 3 story high density (30 units per acre) Apartments. The City Planning Department only notified 200 residents of Mountain Shadows, did NOT notify The Navigators and has a very vague plan. As a community we are fighting this zoning but need additional support. During the Waldo Canyon Fire half of our neighborhood was evacuated days before and some residents only had 15 to 30 minutes to evacuate before their homes were on fire. The bottleneck of traffic impeded fire trucks to come into the neighborhood. Adding another potential 4,000 cars to the area to an already stressed Garden of the Gods Road due to tourists will be dangerous if another fire ignites.

Alternatively, use the "add file" button to send your comments as a file attachment.

This content is neither created nor endorsed by Google.

Google Forms

From: Margie Huntington
To: Weinstein, Laura
Subject: EXTERNAL: [PPROEM Site] Contacts Form - new submission
Date: Sunday, October 18, 2020 12:18:06 PM

Margie Huntington just submitted your form: Contacts Form
on PPROEM Site

Message Details:

Name: Margie Huntington

Email: margie.huntington@gmail.com

Subject: Hazard Mitigation Plan update

Message: Please consider utilizing establishments that can easily be converted such as Healthcare Resort of Colorado Springs. This facility has a second floor dedicated to long-term residents. The bottom floor is currently designed to provide support for 100 short-term, one-to-two month residents. This bottom floor could easily be repurposed since it is intended for post-surgery recovery. If COVID shuts down many surgical procedures, the entire facility could easily be repurposed; i.e. orphans, COVID isolation. Currently, most residents reside in their own rooms. These rooms are large enough to support double occupancy if needed. I believe there are other facilities in Colorado Springs that could be easily converted for hazard mitigation. Margie Huntington 719-598-2872

To edit your email settings, go to your Inbox on desktop.

From: Virgil Hodges (Marshal)
To: Schaub, Michael P
Subject: FW: Multi hazard plan
Date: Wednesday, October 7, 2020 10:52:13 AM

CAUTION! - External Email. Malware is most commonly spread through unknown email attachments and links. DO NOT open attachments or click links from unknown senders or unexpected email!

Virgil Hodges, Marshal
Town of Green Mountain Falls, Colorado
719-684-9415
Marshal@gmfco.us

From: Virgil Hodges (Marshal)
Sent: Wednesday, October 7, 2020 10:48 AM
To: Mike Schaub <MikeSchaub@elpasoco.com>
Cc: Angie Sprang <manager@gmfco.us>
Subject: Multi hazard plan

Mike, just a few corrections
Page 3-38 sec 3.1.22
Change police chief to Town Marshal
Page 3-40
Change references to police to Marshal in first sentence, 1st paragraph, and delete full time sergeant and change 4 reserves to 3 reserve deputies.
Under public works there are 2 employees
Page 3-67 Table 3-21
Planner change answer to yes we have a position of Town Planner
Emergency Manager id the Town Marshal
Grant writer change to yes and the position is the Town Manager
Page 3-68 Table 3-22
Incur debt through special tax bonds change answer to yes

Thank you for all your work!!!!!

From: Bob Radosevich <bob@palmer-lake.org>
Sent: Friday, October 16, 2020 7:41 AM
To: Schaub, Michael P <Michael.Schaub@coloradosprings.gov>
Subject: HMP changes

CAUTION! - External Email. Malware is most commonly spread through unknown email attachments and links. DO NOT open attachments or click links from unknown senders or unexpected email!

Mike,
Finally, here are the changes.
Thanks,
Bob

Section 1.25

1. TOWN OF PALMER **LAKE (LAKE) needs to be added.**

2. The Town is governed by the Board of Trustees and a staff positions that include the Town Administrator/Town Clerk …..

3. Section 3.1.25 is incorrect, in that the Town should be "The Town of Palmer Lake," drop 'Volunteer' from the description of Fire Chief, and change Police Lieutenant to Police Chief in the second paragraph. The fire department description should read:

   "The Town of Palmer Lake Fire Department has a staff that operates 24 hours a day, seven days a week. Led by a full-time Fire Chief/Paramedic working Monday-Friday 8 am – 4 pm. The daily staffing includes a company officer (Captain or Lieutenant) working a 48/96 hour schedule. Part-time engineers and a cadre of 10 volunteers fill out the remaining positions on a shift. All paid members are certified to NFPA 1001 Fire Fighter I, and the EMT-B level, at a minimum. Palmer Lake enjoys the benefits of a robust Mutual Aid Agreement through El Paso County and the 'North Group' (Donald Wescott, Air Force Academy, Tri-Lakes Monument,

Black Forest, and Larkspur)."

4. Police Department

The Palmer Lake Police Department protects the community and Provides law enforcement services to protect life and property. The Police department consists of a Police Chief, 2 Sergeant's, 7 part-time officers, a code enforcement officer, and 5 reserve officers. Emergency communications are a joint responsibility between the local jurisdiction, the El Paso County Sheriff's Office and the EL Paso-Teller County 911 Authority.

5. Palmer Lake Water Department – Operates and maintains 2 water wells and treatment facilities.

6. In reference to #56:
7. The joint evacuation drill was not conducted this year due to COVID-19 concerns, we are still in communication with OEM on this.
8. Reference to #57:To my knowledge this was approved by the council and was completed by the Gentleman they hired to do it. I apologize I do not remember his name.

Sorry it took so long.

Bob

Bob Radosevich
Interim Town Administrator
(719) 481-2953
bob@palmer-lake.org

PPROEM Draft Multi-hazard Mitigation Plan

Manitou Springs comments

by Karen Berchtold, kberchtold@manitouspringsco.gov

Ch. 3 Capabilities (P. 3-40- through 3-47 plans, codes, capabilities)

p. 3-43 Local EOP – most recent update is 2016.

p. 3-44 Fire – Please note that Fire Department provides City's Disaster Incident Command.

p. 3-47 Please note that Public Works oversees the City's Capital Improvement Plan.

p. 3-61 – why does Table 3-14 say "no" to many items that COS has in place, such as a General plan, subdiv ordinance, zoning ordinance, stormwater management, etc.?

p. 3-68, Table 3-23:

Capital improvements plan – should say "YES"

Local EOP – should say updated 2016

Other special plans –add "Transportation and Mobility Master Plan," "Flood Control Master Plan," "Hazard Mitigation Plan" (unless that should have it' own line), remove Rainbow Vision Plan (obsolete comp plan)

p. 3-69, Table 3-24:

Planner/Engineer/scientist w understanding of natural hazards – Add "Planning Department"

Personnel skilled in GIS – YES – Planning, Public Works (not contractor)

Grant Writer – YES

Emergency Manager – YES – Fire Department, not Police

Ch. 4 -HIRA

Flood events – p. 4-22 – summary does not cover all major MS flood disaster declarations and events

Table 4-5: Include declaration type - level of disaster declaration? In 2013, both state and federal disasters. Crystal Abeyta Manitou recovery cost totals from diverse grant programs for 2013 & 2015.

July 1, 19, 2013 –local disaster declaration (then state?). Flash flooding, mud/debris flows down Williams Canyon, 17 structures damaged/destroyed and significant impacts to infrastructure. 40 vehicles damaged/destroyed. No injuries reported. (table - notes 1M in damages. FEMA Preliminary damage assessment was 6.7 million).

August 9, 2013 - flooding, mud/debris flow, local disaster declaration (then state?). Significant damage to 6 buildings, some damage to 11 additional structures. Resulted in one death on Highway 24 near Manitou (Suggest adding to flood table)

September 10-15, 2013 flooding - Presidential major disaster declaration for El Paso County, including Manitou Springs. Doc notes value of MS losses on 9-12-2013 only $100,000? Seems low; should be much higher.

Total of losses following summer 2013 flooding was substantial. Two homes completely destroyed, 30 homes sustained major damage, damage to at least 40 commercial structures, significant impact to tourist economy, widespread damage to public infrastructure – roads, drainageways, City Hall, parks.

May-June 2015 – ongoing significant flooding /debris flow. May 9 event resulted in closing of several major roads. Add May 9, 2015 to table.

August 10, 2015 flood event exacerbated by Williams Canyon runoff resulted in several road closures. Staff will confirm estimated damages, $100,000 seems low.

p. 4-24 – Narrative description - Add July 2013, August 13 events to narrative?

p. 4-25 –Note Sept 2013 flooding triggered federal disaster declaration for El Paso County.

Repetitive loss properties – MS has eleven (but no severe RL properties)

p. 4-27, Table 4-8 - Acreage in 100-, 500-year floodplains.

Why is value the same for both zones for most communities? (Values in MS HMP slightly lower)

p. 4-31, Table 4-9 Structures exposed to 100-, 500-year FP

Draft notes 172, 208 structures, respectively. MS HMP notes 480 and 552 structures, respectively. For 100-year, MS notes value for exposed structures, contents much higher – $323,911,336 vs $36,583,987 in PPR plan. (note – MS also includes lower value for "estimated losses" of $192M)

p. 4-45

In MS HMP, structure counts in floodplains very different from PPR doc- structure count in 100 year FP = 480, not 172. Structure count in 500 year FP = 552, not 208.

(From Manitou Springs local HIRA https://planmanitou.com/wp-content/uploads/2017/04/AppendixC_RiskAssessment_170413_final.pdf, page 44).

Document notes MS potential building value loss from flooding is 36.5M. MS HIRA notes this as much higher – see page reference above (based on HAZUS approach; does this include structure, contents, or both?)

p. 4-33, Table 4-12: Crit facils & infra – says "NA," – this should include City Hall (including Police Dept) and Fire Dept

p. 34 – Consequence Analysis –

Hazard Desc – I disagree w statement "flooding has been fairly limited in magnitude"; MS is a small community and 1999 & 2013 flooding caused significant impacts to our community.

Impact to prop, facils, infra – notes COS is only jurisdiction w exposure to Critical facilities; as noted above, MS has some, too. Also, impacts to trails and recreation facilities have been severe and costly.

Impact on Econ Condition - MS economy relies heavily on tourism and our Downtown is along Fountain Creek, so impacts to businesses & infrastructure can cause significant impacts to local economy.

Dam Hazard

p. 4-44 – Insert map for Manitou needs to be at a smaller scale so the dam location is visible

Mud/Debris flow

4-51 – Please note additional debris flow event on **July 23, 2018**. Mud/Debris flow occurred throughout the community in conjunction with a hail storm, damaging public and private property throughout community. FEMA Preliminary Damage Assessment estimate of $2.5 million in damages to public infrastructure $200,000 expended costs for cleanup and repairs. Do we consider this flooding, or erosion/debris flow? Add cost to flooding or debris flow table.

4-59 – table 4-19. In addition to 1 school, our Fire Department is in the path of debris flow from slopes to south.

4-65, table 4-21 – hailstorm on July 23, 2018 led to subsequent debris flow

Geologic

p. 4-172, Table 4-56. 2015 – large boulder fell and damaged Townhouse Lounge

p. 4-173 Figure 4-53, Risk score summary. Question: is this for both landslide and rock fall? Manitou Springs is ranked "Limited" for Spatial extent – but 24% of area is noted as exposed. Where is cutoff for "moderate" category? CGS also prepared a map for MS but it requires geologist interpretation.

P 4-179, table 4-58 – only 3 structures exposed? Table 4-59 – notes only 8 people exposed? Both seem low considering spatial extent.

CGS informed MS is at high risk for erosion, another geologic risk.

Wildfire – uses COWRAP data.

p. 4-189 – table 4-62. Notes MS overall risk score is "moderate." Is this due to "percent exposed to moderate to very high risk – 36%"? Per Mike Schaub, this goes back to spatial extent of risk across the community; however, if we provide them with the rationale/"ammunition" to designate higher risk, that can be done. (review w Chief Forsett). KB shared Chief Forsett's 2018 letter to elected officials regarding WUI.

Table 4-64 – Exposed structure count for MS is 119, or 6%. Again, seems low.

Table 4-66 Critical or High Potential Loss facilities – Manitou Reservoir, Water treatment plant, Mesa water storage Tank, High School/Middle School, CSU Hydro plant (review w Chief Forsett). IN MS, concern is that wildfire could be followed by debris flow/mud slides that could block creek flow of Ruxton or Fountain Creeks.

p. 4-196 – Erosion/debris flow could block creek flow, causing massive flooding (MS)

p. 4-199 – need for regional collaboration across jurisdictional boundaries

Mitigation Strategy

- Manitou Springs – plan currently includes 9 mitigation actions. Minor updates.
- Karen will provide a list with 17 additional actions from our MS HMP.

OTHER NOTES for internal:

KB – areas for follow up

CRS – I'm interested in understanding how other communities in our region approach this program.

Also provide:

Mud/Debris Flow Susceptibility map from CGS, obtain map used in PPROEM draft

Appendix C – Plan Maintenance Forms

APPENDIX C: PLAN MAINTENANCE FORMS

Annual Mitigation Plan Progress Report Form

Mitigation Action/Project Progress Report		
Progress Report Period	From Date:	To Date:
Action/Initiative Name		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Project Status	o Project completed o Project canceled o Project on schedule o Project is ongoing o Anticipated completion date: _____ o Project delayed Explain _____	
Summary of Project Progress for this Report Period		
1. What was accomplished for this project during this reporting period?		
2. What obstacles, problems, or delays did the project encounter?		
3. If uncompleted, is the project still relevant? Should the project be changed or revised?		
4. Other Comments		

Plan Update Evaluation Worksheet

Year Reviewed: _____

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	
	Have any internal or external agencies been invaluable to the mitigation strategy?	
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	
	Has the Planning Team undertaken any public outreach activities?	
	How can public participation be improved?	
	Have there been any changes in public support and/or decision-maker priorities related to hazard mitigation?	
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	
	Are there different or new education and outreach programs and resources available for mitigation activities?	
	Has NFIP participation changed in the participating jurisdictions?	
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	

Plan Section	Considerations	Explanation
	Should the list of hazards addressed in the plan be modified?	
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	
	Have any changes in development trends occurred that could create additional risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	
	Are there new funding sources to consider?	
	Have elements of the plan been incorporated into other planning mechanisms?	
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	
	What are needed improvements to the procedures?	

Appendix D – Completed & Removed Actions

APPENDIX D: COMPLETED ACTIONS

Initiative	Description	Hazard(s) Mitigated	Status Description	Priority	Cost	Lead & Support Agency
EPC Countywide						
Initiative #3— Perform Continuity of Operations Planning	Perform Continuity of Operations planning to identify critical functions, essential personnel, vital resources, and critical infrastructure within the county that is necessary to maintain public safety and services	All	The Pikes Peak Regional Office of Emergency Management created a Continuity of Operations Plan template and distributed it to various county agencies including Department of Public Works, Administration and Public Health. Several exercises have been conducted and improvement plans have been implemented.	Low	Med	PPROEM - Public Services Department, Municipalities and County Agencies
Initiative #9— Create an All-Hazard Zoning Plan	Create an all-hazard zoning plan to facilitate a more rapid evacuation capability within El Paso County.	All	Evacuations and an all-hazard zoning plan are addressed in the El Paso County Office of Emergency Management Evacuation Plan which was completed in 2018.	Low	Med	PPROEM - Public Services Department, El Paso County Sheriff Office- Dispatch
Initiative #15— Acquire Software for Facility Tracking and Multi-Jurisdictional Response	Acquire common software to aid in Tier II facility tracking and multi-jurisdictional response, improving interoperability between Colorado Springs and El Paso County HAZMAT teams.	Hazmat	Colorado Environmental Online System (CEOS) handles a variety of environmental reporting requirements at CDPHE. EPA's free Tier 2 Submit software and CAMEO are also software options.	Med	Med	PPROEM - Public Services Department, El Paso County IT
Initiative #18— Identify Critical Roads and Emergency Routes	Identify critical roads and emergency routes within El Paso County and coordinate inter-jurisdictional plans to insure they remain clear.	Hailstorm, Mud or Debris Flow, Tornado, Wildfire, Winter Storm	This is addressed in the El Paso County Department of Public Works Street Priority List.	High	high	PPROEM - Public Services Department, EPC Department of Transportation
Initiative #21— Identify Drainage Basins that Require Flood Warning Systems and Explore Early Warning Systems for Flash Floods	Identify drainage basins that require installation of a flood warning system, and explore technology solutions to improve threat recognition to provide early warning of potential flash flood and debris flow incidents.	Flood, Mud or Debris Flow	Drainage basins have been installed and are maintained. Rain gauges have been installed by the USGS and are monitored.	High	Med	PPROEM- Public Services Department, Local Jurisdictions
Initiative #22— Install Electronic Warning Signs and Road	Install electronic warning signage and permanent road closure	Erosion and Deposition, Flood, Mud or	Highway signs and variable message boards have been installed along the Highway 24 corridor.	Low	high	CDOT, EPC Department of Transportation,

Initiative	Description	Hazard(s) Mitigated	Status Description	Priority	Cost	Lead & Support Agency
Closure Barriers on Highway 24	barriers on Highway 24 in the Ute Pass area.	Debris Flow, Wildfire, Winter Storm				PPROEM - Public Services Department
Initiative #24— Identify High-Threat Properties that may be Relocated or Purchased	Identify high threat properties within potential hazard areas that may be relocated or purchased to reduce risk to persons or property.	Erosion and Deposition, Flood, Mud or Debris Flow, Wildfire	El Paso County has purchased, acquired, removed and completed the process of 3 potential high risk properties resulting from damaging floods. The newly empty lots are now open space.	Med	high	EPC Flood Plain Manager, PPROEM - Public Services Department
Initiative #25— Channel Stabilization, Improvement, and Restoration in Fountain Creek	Conduct channel stabilization, improvement, and restoration in Fountain Creek to allow greater drainage and water flow capacity	Flood	Multiple projects from the 2013 and 2015 floods have been completed. Riverside Trailer Park site restoration and streambank work, along with the Willow Springs Pond project remain in progress.	Med	High	Ongoing
Initiative #26— Stabilize or Remove Rocks Along County Roadways	Stabilize or remove rocks that pose a hazard along county roadways.	Erosion and Deposition, Landslide and Rockfall	This project has been completed. In coordination with the Colorado Department of Transportation, El Paso County installed mesh nets to stabilize rocks and debris along the Highway 24 corridor. Rocks that were not able to be stabilized were removed.	Low	high	CDOT, EPC Department of Transportation, EPC OEM - Public Services Dept.
Initiative #31— Provide Education to First Responders to Minimize Effects of Disease on Response Capability	Provide education to first responders to minimize the effects of disease on response capability.	Pandemic	This is addressed in the 2018 El Paso County Public Health Pandemic Disease Plan.	Low	Med	El Paso County Public Health
Initiative #32— Establish More Robust Vaccination Program	Establish a more robust county employee vaccination program to maximize available workforce during a potential outbreak.	Pandemic	The El Paso County Public Health Department has a robust annual back to school immunization program as well as a seasonal influenza campaign. El Paso County Public Health also assists with specific vaccinations after disasters for affected populations.	Low	Med	El Paso County Public Health
Fountain						
Initiative #39— Put Flood Information on the City Website	Add flood information on City website to educate the community about flood risk and emergency actions.	Dam failure, flood	During flood season this info can be found on City Council minutes; the City has chosen not to put on their website A new/modified version of this action is included in Table 5-2.	High	Low	City of Fountain OEM
Initiative #40— Flood Information Handouts at City Hall	Put flood information handouts at City Hall to educate the community about flood risk and emergency actions.	Dam failure, flood	Supplies are present at City Hall A new/modified version of this action is included in Table 5-2.	Med	Low to Med	City of Fountain OEM

Initiative	Description	Hazard(s) Mitigated	Status Description	Priority	Cost	Lead & Support Agency
Initiative #43— Coordinate Conservation and Mitigation Actions with the Water Department	Coordinate conservation and mitigation actions with the Water Department to reduce the impact of droughts	drought	City Water has put in smart meters and completed water mitigation efforts against chemicals.	High	low	City of Fountain Utilities Department
Initiative #45— Protect Critical infrastructure from Lightning Strikes	Protect critical Infrastructure from lightning strikes	lightning	All panels have been changed out to be lightning-resistant and surge protected; IT as well	Low	Med	City of Fountain OEM
Initiative #46 — Coordinate Flood Mitigation with City Drainage Plans	Coordinate flood mitigation planning and activities with City Drainage Plans	dam failure, flood	City engineer dispatched to ensure no flood issues are involved prior to project starts	high	low	City of Fountain Department of Public Works
Initiative #56— Expand Vaccination Program	Expand vaccination program to include all first responders and emergency management staff who may have an emergency role such as EOC personnel and the emergency communications personnel to help ensure emergency personnel are available to assist in an incident.	pandemic	All City field workers get Tetanus/Hep/Influenza vaccines free of charge annually	Med	Med	City of Fountain Office of Human Resources Department
Green Mountain Falls						
Removed Initiative #56— Install Cell Phone Tower Within Town	Coordinate with cell phone companies to increase cellular communication to provide notification to citizens.	dam failure, earthquake, flood, wildfire, winter storm, hazmat	This has not happened and is unlikely to in the near future w/o interested cellular providers. Town Staff has explored this as an option, and the amount of business (low ROI) for providers in GMF makes it unlikely that they will invest in the installation of additional cell tower(s).	Med	High	Town of Green Mountain Falls
Removed Initiative #60— Install Early Warning System in Town Hall	Install early warning system in our new Town Hall to inform citizens of immediate danger and educate community on siren sounds.	Dam Failure, flood, wildfire	This plan left when the former marshal quit and there is no plan to revisit it.	high	Low	Fire Protection District
Monument						
Initiative #63— Obtain Generators for Critical Infrastructure	Obtain generators to provide backup power for critical infrastructure during emergencies.	all	This project has been completed. A fixed natural gas supplied generator has been installed to service the Monument Town Hall/Police Department in case of catastrophic or prolonged power outage. A 250KW portable generator, large enough to run several of our water treatment plants has been purchased.	Med	high	Town of Monument

Initiative	Description	Hazard(s) Mitigated	Status Description	Priority	Cost	Lead & Support Agency
			The portable generator could also be used for other purposes. Generators worked during the March 2019 Blizzard.			
Initiative #65— Ensure Water Tanks/Water Sheds Have Adequate Fire Protection	Ensure water tanks/water sheds have adequate fire protection, for example, protected with concrete walls/roofs; 30-foot mitigation zones.	wildfire	The project has been completed. Fire mitigation has been done around all the water facilities to include the water storage tank. The facilities all are covered by existing water fire hydrants.	Low	Med	Town of Monument
Initiative #70— Install Lightning/Ground Protection on Critical Infrastructure	Install lightning/ground protection on critical infrastructure.	Lightning, tornado	The project is completed. The Town Water Department has installed lightning protection on all water treatment plants and other critical infrastructure.	Med	Med	Town of Monument
Manitou Springs						
Initiative #79— Perform Continuity of Operations Planning	Perform Continuity of Operations planning to identify critical functions, essential personnel, vital resources, and critical infrastructure within the county that is necessary to maintain public safety and services.	Severe Weather, Geologic, wildfire, Hazmat, Dam Failure, Flood, Mud or Debris Flow	Continuity of Operations Plan was updated by Department in February of 2020.	Med	Med	Manitou Springs Police Department
Initiative #81— Adopt Fire Adaptive Community Standards and Practices	Encourage communities within the county to adopt Fire Adaptive Community Standards and Practices.	Lightning, wildfire	Community Standards (Zoning Code and Subdivision Regulations) are addressed in the Plan Manitou Hazard Mitigation Plan. These standards are referenced to NFPA Standards or the 2015 IWUIC where appropriate. Plan Manitou Hazard Mitigation Plan was reviewed and approved by City Council.	High	Med	HOAs/ Municipality/Fire Department
Initiative #82— Fund and Execute Phase II and Phase III of Fountain Creek Structural Mitigation Projects	Fund and execute Phase II and Phase III of Fountain Creek Structural mitigation projects.	Dam Failure, Flood, mud or debris flow, Subsidence and sink holes	Both Phases II and III are complete.	Med	High	Manitou Springs Recovery Manager
Initiative #83— Dredging of Fountain Creek within Manitou Springs	Dredging of Fountain Creek within Manitou Springs.	Dam Failure, Flood, mud or debris flow, Subsidence and sink holes	The dredging of Fountain Creek through Manitou Springs is complete.	Med	High	Manitou Springs Recovery Manager
Initiative #84— Expand the Local Early Warning System to	Expand the local early warning system to encompass all-hazards.	All	Sirens are in place and are tested periodically. The Everbridge System is also used as a back-up.	High	Low	City of Manitou Springs

Initiative	Description	Hazard(s) Mitigated	Status Description	Priority	Cost	Lead & Support Agency
Encompass All Hazards						
Removed Initiative #85— Increase Number of Local Responders Trained as HAZMAT Technicians	Increase the number of local responders trained as HAZMAT technicians.	Hazmat	It is not fiscally sustainable for the City of Manitou Springs to maintain internal resources (personnel and equipment) to a Technician certification level. All fire fighters are trained to the Awareness and Operations level. The City of Manitou Springs relies on MOU/IGA for Hazardous Materials response with state and regional partners.	Low	Medium	Manitou Springs Fire Department
Colorado Springs						
W1- Wildland-Urban Interface action	Formally define the WUI as a different polygon than the Hillside overlay. Make this distinction clear in the locally adopted codes and information materials.	wildfire	The City of Colorado Springs' Wildland Urban Interface (WUI) has been updated with the latest boundaries to be implemented with the adoption of the 2015 International Fire Code as amended. The adoption of the WUI boundaries and code became effective, May 24th, 2018. The WUI boundaries remained the same with an addition of an annexed parcel located adjacent to the United States Air Force Academy Visitor Center. The WUI is now 32,655.25 acres.	Med	Low/ staff time	Division of the FM
W5- Enhance WHINFOE Risk Model	Enhance the Wildfire Hazard Information Extraction (WHINFOE) risk model to include adjacency of structures and urban conflagration potential.	wildfire	The Wildfire Hazard Information Extraction model (WHINFOE) is a Colorado Springs Fire Department program developed to educate the residents within the WUI about wildfire risk. This educational tool enables the Wildfire Mitigation Program to help residents reduce their wildfire risk while working with their neighbors to reduce risk to the community. The current model is in the process of being updated with new attributes and data resources to further provide wildfire risk education.	Med	Low to Med	Division of the FM, Colorado Springs Information Technology (IT) Department
F4- Address Erosion and Sloughing on Stream Banks	Evaluate additional feasible and functional ways to reduce or eliminate erosion and sloughing on stream banks. Include long-term maintenance considerations in the evaluation.	flood	Work has been completed along several creeks within the city to secure banks eroded by recent floods and the wildfire burn scar. In 2018, the City implemented of the Stormwater Infrastructure Master Plan. The master plan includes an assessment of all City natural channels. Colorado Springs Utilities maintains stream banks that impact utilities' infrastructure. All natural channels are re-assessed on an annual basis. Colorado Springs Utilities has no change	low	Low to Med	Public Works/Stormwater
F6. Emergency Action Plans for Streams in Monument Creek Watershed	Monument Creek is the downstream receiving water for many dams where a failure could affect Colorado Springs. Verify that EAPs are available for all higher risk upstream dams.	dam failure	EAPs for Colorado Springs Utilities and City-owned dams are up to date. The City of Colorado Springs Department of Parks, Recreation and Cultural Services (PRCS) has a flood evacuation plan for Garden of the Gods and Midland Trail.	low	Low	CSU, City Parks and Recreation, OEM – non CSU and Parks and Recreation dams

Initiative	Description	Hazard(s) Mitigated	Status Description	Priority	Cost	Lead & Support Agency
F7. Evaluation of Enhancements and Enforcement of the Flood Ordinance	Evaluate the potential of implementing code and/or regulations revisions to further limit or eliminate development in the 100-year floodplain. Enforce current code – don't permit exceptions and variances	flood	All plans are reviewed and all building permits are evaluated for compliance. Codes and ordinances are reviewed with input from communities. There have been no changes in code from 2018-2019. FEMA floodplain maps show an increase in the number of properties within the floodplain which are due to property improvement; however, the structures are actually in safe places. The Planning Department has a stream side overlay that limits impermeable surfaces along the stream. Floodplain preservation is already part of the City planning process and adequate restrictions are in place. Therefore, no new code revisions are required at this time.	low	staff time	Planning, Public Works, Pikes Peak Regional Building Department
F9. Public Awareness and Messaging about Dams	Implement public awareness campaign about dams which includes: Develop a public relations plan to increase public awareness about the dams in Colorado Springs, Develop Public Safety messages for Dam Failure, Target the spring time (2016) in preparation for the monsoon season	Dam failure	The newly developed Stormwater Enterprise will be sending out flyers with the residential billing to inform the general public of flood mitigation projects and the dangers of flooding. No messaging was done specific to dam flooding in 2019, however, messaging was done for generalized flooding.	High	Low/Staff time	CSU, City Parks and Recreation, OEM
REMOVED F10. Gauge-Adjusted Radar Rainfall (GARR) System	Re-evaluate the cost/benefit of integrating the available rain gauges with the Gauge-Adjusted Radar Rainfall (GARR) System. Re-evaluate the feasibility and cost/benefit of improving the reporting speed of rain gauges already in place.	Flood	The City uses several free and vendor-based weather monitoring services to inform streets and responder actions. These services already use information from precipitation and stream flow gauges. The time lapse between when the information is sent from the gauge to receiving systems often takes more than 10 minutes. Currently, there is not a cost effective solution to speed up obtaining information from the precipitation and stream flow gauges.	Low	Low/Staff time	OEM
F11. Property Acquisition	Coordinate the acquisition of eligible properties with property owners and State/Federal programs.	Flood	Eleven properties were acquired in 2019, bringing the final total number of acquisitions to fourteen. Demolition of many properties continued through the end of 2019 and all must be completed by March 31, 2020, when the grant funding expires.	Med	High	Public Works, OEM, Parks and Recreation, Real Estate Services, Planning
SW4- Evaluate Need for Severe Weather Protection in building codes	Influence building codes to mitigate for severe weather. This could be implemented more readily for City-owned properties. Evaluate whether certain roof types could be required to mitigate the impacts of hail and damaging winds.	Severe Weather	Building codes are already part of the City planning process and adequate restrictions are in place. Therefore, no new code revisions are required at this time.	low	Staff time	Pikes Peak Regional Building Department

Initiative	Description	Hazard(s) Mitigated	Status Description	Priority	Cost	Lead & Support Agency
SW6. Evaluate Need to Modify Building Codes for Drought/Water Conservation	Review building codes to encourage xeriscape landscapes.	Severe Weather	City Council approved an Ordinance on December 19, 2019, regarding Water-wise rules. More information can be found at: https://www.csu.org/Pages/waterwiserules.aspx	Low	Staff time	CSU
G2 - Landslide/ Earthquake Outreach and Education	Provide outreach to the public on landslide/earthquake risk and mitigation actions they can take to protect themselves and their property.	Geologic Hazards	Most earthquakes are low risk with a Seismic Category C of 1 percent (%). The preparedness guide contains information on landslides and debris flow. Information is also on the PPROEM and City of Colorado Springs websites.	Med	Staff time	OEM
H4 - Sustain Tier II Reporting	Sustain Tier II facility reporting using the Hazardous Materials Management and Emergency Reporting System (HAMMERS).	Human-caused hazards	CSFD worked with the HAMMERS program to alert Colorado Springs Police Department (CSPD) to possible hazardous materials facilities. Placed Be On the Look Out (BOLO) on buildings that could possibly be a hazardous environment.	Med	Staff time to Low	LEPC, CSFD
F8. Drainage Criteria Manual Update	Consider updating the Drainage Criteria Manual to provide specific guidelines for accommodating long-term maintenance (access, etc.) in the design requirements for storage (sediment catchment and stormwater detention) basins. Update the City of Colorado Springs Drainage Criteria Manual, Volume 1 & Volume 2, to provide for Sustainable and Resilient Stormwater.	Flood	Complete. Public Works continues to work with consultants and draft changes in both volumes for future updates; changes expected to go in effect by the end of 2020.	Med	Low/ staff time	Public Works
Palmer Lake						
Initiative #61— Joint Evacuation Drill	Police Department will do a Joint Evacuation Drill on September 24, 2020 (barring COVID)	All	Identified for 2020 plan update. Completed prior to update.	High	Med	Town of Palmer Lake
Initiative #62— Permitting Staff Addition	Town of Palmer Lake (TOPL) hired an HS4 consultant as we must now be permitted	All	Identified for 2020 plan update. Completed prior to update.	High	High	Town of Palmer Lake
Initiative #63— Join Colorado Storm Council	TOPL joined Colorado Stormwater Council	All	Identified for 2020 plan update. Completed prior to update.	Med	Low	Town of Palmer Lake

Appendix E - Plan Adoption Resolutions

TOWN OF RAMAH
P.O. BOX 129
113 S. COMMERCIAL
RAMAH, CO 80832
719-541-2163
FAX 719-541-3978
Email: townoframah@juno.com

October 21, 2020

Pikes Peak Regional Emergency Management
Attn: Mike Schaub
Via e-mail: Michael.schaub@coloradosprings.gov

Dear Mike,

The Town of Ramah has reviewed our portions of the Multi-Hazard Mitigation Plan. Everything looks good for our town. The Town of Ramah approves this draft HMP.

Cordially,

Cindy M Tompkins

Cindy M Tompkins, CMC
Town Clerk

October 7, 2020

Mr. Jim Reid
PPROEM Director

Re: Multi-Hazard Mitigation Plan

After reviewing the Multi-Hazard Mitigation Plan, I found it to be a very comprehensive document including the initiatives 34-46. You have identified and assessed reduction of long-term risk to life and property from hazard events. The City of Fountain agrees with the plan and will support your recommendations.

Thank you,

Scott Trainor
City Manager

The Town of

Green Mountain Falls

P.O. Box 524, 10615 Green Mountain Falls Road, Green Mountain Falls, CO 80819 (719) 684-9414, www.gmfco.us

10/30/2020

PPROEM

Re: PPROEM Multi-Hazard Mitigation Plan

After reviewing the final draft of the Multi-Hazard Mitigation plan, the Town of Green Mountain Falls has made and submitted the necessary changes concerning the Town. (see email dated 7 October, 2020)

The Town, hereby, approves those portions of the Plan which specifically apply to the Town of Green Mountain Falls.

Sincerely,

Virgil Hodges, Marshal for Angie Sprang
Angie Sprang
Town Manager
Town of Green Mountain Falls Colorado

November 2, 2020

Mr. Jim Reid
Director
Pikes Peak Region Office of Emergency Management
3755 Mark Dabling Boulevard
Colorado Springs, CO 80907

RE: Pikes Peak Region Multi-Hazard Mitigation Plan

Dear Mr. Reid,

After reviewing the Pikes Peak Region Multi-Hazard Mitigation Plan and Manitou Springs' staff comments, I found it to be a very comprehensive document. Your team has identified and assessed reduction of long-term risk to life and property in the Pikes Peak Region from hazard events. Manitou Springs' staff reviewed the draft and forwarded comments to Pikes Peak Region Office of Emergency Management staff on October 30, 2020. Pending incorporation of those comments into the plan, the City of Manitou Springs agrees with the plan and will support your recommendations.

Sincerely,

Denise Howell
City Administrator

Cc: Christine Lowenberg, John Forsett, Karen Berchtold

606 Manitou Avenue
Manitou Springs, CO 80829

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FAX: 719-685-5233

October 28, 2020

PPROEM Director

Re: PPROEM Multi -Hazard Mitigation Plan

After reviewing the final draft of the Multi- Hazard Mitigation Plan the Town of Monument has submitted and made all necessary changes and updates and approves the specific portions that directly relates to the Town of Monument. We appreciate all the efforts made by all.

Thank you,

Mike Foreman
Town of Monument
Town Manager

645 Beacon Lite Rd., Monument CO 80132 Phone: 719-481-2954 Fax: 719-884-8011 www.townofmonument.org

October 29, 2020

PPROEM Director

RE: PPROEM Multi-Hazard Mitigation Plan

After reviewing the final draft of the Multi-Hazard Mitigation Plan, the Town of Palmer Lake has submitted and made all necessary changes and updates and approves the specific portions directly relating to the Town of Palmer Lake.

We appreciate all the efforts made by all, thank you.

Sincerely,

Bob Radosevich
Interim Town Manager
Town of Palmer Lake

42 Valley Crescent, P.O. Box 208, Palmer Lake, CO 80133
Phone (719) 481-2953 - Fax (719)488-9305
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TOWN OF RAMAH
P.O. BOX 129
113 S. COMMERCIAL
RAMAH, CO 80832
719-541-2163
FAX 719-541-3978
Email: townoframah@juno.com

October 29, 2020

Pikes Peak Regional Emergency Management
Attn: Mike Schaub
Via email: Michael.schaub@coloradosprings.gov

Dear Mike,

The Town of Ramah has reviewed our portions of the Multi-Hazard Mitigation Plan. We would also like to change the hazard risk rating on table 4-4 for wind to moderate. The Town of Ramah approves this draft HMP.

Cordially,

Cindy M Tompkins

Cindy M Tompkins, CMC
Town Clerk

Appendix F - References

APPENDIX F: REFERENCES

Sources Consulted

In addition to those listed below, sources used in the 2020 Plan are listed throughout the document in the footnotes and citations associated with figures, photographs, and tables.

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