CITY OF COLORADO SPRINGS

Pre-Disaster Mitigation Plan Update

2010

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Prerequisites

RESOLUTION NO. 161-10

A RESOLUTION TO ADOPT THE 2010 PRE-DISASTER MITIGATION (PDM) PLAN FOR THE CITY OF COLORADO SPRINGS

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF COLORADO SPRINGS:

Section 1. The City Council approves the adoption of the 2010 Pre-Disaster Mitigation (PDM) Plan, which establishes a policy to continue development of a strategy to eliminate or reduce long-term risks to people and properties due to natural and human-caused hazards.

Section 2. The Mayor is authorized to execute the adoption of the 2010 PDM Plan. The Office of Emergency Management Division Manager is authorized to oversee implementation of the 2010 PDM Plan for the City of Colorado Springs.

Dated at Colorado Springs this 28th day of September, 2010.

Mayor

Attest:

City Clerk

Executive Summary

The purpose of the Colorado Springs Pre-Disaster Mitigation Plan update process was to eliminate or reduce long-term risks to people and properties due to natural and human-caused hazards. This multi-hazard mitigation Plan update (hereafter the "Plan") was developed by the City of Colorado Springs to reduce future losses to the community caused by natural and human-caused hazards.

The Plan update was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to achieve eligibility for the Federal Emergency Management Agency (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)

This Plan is an update of the 2005 Pre-Disaster Mitigation Plan for Colorado Springs, Colorado (2005 PDMP). This update is a single-jurisdictional Plan covering the City of Colorado Springs. Through the leadership of the Colorado Springs Office of Emergency Management, the Colorado Springs PDM Plan Update Planning Subcommittee was formed to assist with the development of this Plan update including data collection, public input on history, community assets and strategies, and identification of preferred mitigation alternatives. This Plan update represents the collective work of the citizens, elected and appointed officials, and other stakeholders in Colorado Springs.

Following FEMA's guidelines in developing a Pre-Disaster Mitigation Plan, the City of Colorado Springs identified risks, assessed vulnerabilities, and identified and prioritized goals and actions for mitigating the affects of natural and human-caused hazards on the communities in the City. The 2005 PDMP evaluated flood, wildfire, landslides, severe weather, drought, earthquake, and tornados. This Plan update broke out the severe weather category into separate hazards, and includes an introduction to human-caused hazards. The following hazards were profiled in this Plan update:

Wildfire	**Severe Winter Storm**	**Hail**
Flood	**Tornado**	**Lightning**
Drought	**Dam and Levee Failure**	**Windstorm**
Earthquake	**Landslide**	**Human-caused hazards**
Hail	**Lightning**	

The results of the risk assessment for identifying probability and magnitude of these hazards in the City of Colorado Springs are summarized below.

Magnitude > Probability V	**Catastrophic**	**Critical**	**Limited**	**Negligible**
Highly Likely			Hail Lightning Severe Winter Storm Typical Flood Windstorm	Grassfire
Likely		Significant Wildfire Tornado Landslide		
Occasional		Significant Flood	Drought	Typical Earthquake
Unlikely	Dam & Levee Failure Significant Earthquake			

The Planning Subcommittee used the risk and vulnerability assessment to develop a citywide mitigation strategy through a list of goals, objectives, and actions. The Subcommittee carefully reviewed the mitigation strategy from the original 2005 PDM Plan, and provided a status update on the mitigation actions identified in that plan. Many of those actions were re-written and consolidated as objectives for this update. The goals from the 2005 PDMP were consolidated into one comprehensive goal, and the Subcommittee developed a list of objectives. The following goal and objectives were developed for the Colorado Springs mitigation strategy for the 2010 update:

Goal
Reduce or eliminate the exposure to property damage, injury or loss of life, and damage to the natural environment caused by natural hazards.

Objectives
A- Identify and initiate improvements to public safety, response, and recovery programs to reduce risk and vulnerability.
B- Follow through with and leverage existing organizations, programs, and procedures to implement the PDM Program.
C- Build upon existing public outreach efforts to reduce risk and vulnerability to natural hazards.
D- Leverage external financial assistance and other resources to strengthen the City's disaster resiliency.
E- Continue to improve the regulatory review process for development and construction in the vicinity of known natural hazard areas.
F- Continue to assess ongoing disaster preparedness programs that maintain or improve City preparedness.

The Planning Subcommittee identified and prioritized mitigation actions to achieve these goals and objectives and to support the purpose of this planning process. The mitigation actions are summarized in the following table.

Action #	Mitigation Action Description	Hazard	Responsible Agency
Objective A: Identify and initiate improvements to public safety, response, and recovery programs to reduce risk and vulnerability.			
A-1	Upgrade aging infrastructure such as transportation, drainage, utilities, and others that could be affected during a major natural disaster.	All Hazards	OEM, CSU, and Engineering
A-2	Evaluate repetitive loss properties and potential solutions to mitigate existing conditions.	Flood	OEM, PPRBD
A-3	Update and maintain the Jimmy Camp Creek and Cottonwood Creek Drainage Basin Planning Studies.	Flood	Engineering
A-4	Evaluate funding alternatives to achieve United States Army Corps of Engineers (USACE) certification of the Templeton Gap Floodway (levee).	Flood, Dam & Levee Failure	Engineering
Objective B: Follow through with and leverage existing organizations, programs, and procedures to implement the PDM Program.			
B-1	Continue to expand the capabilities and participation of the Emergency Management Committee and Volunteer Committee.	All Hazards	OEM
B-2	Develop a strategy to integrate the PDM plan with the City's strategic plan and other long-term planning documents.	All Hazards	Planning
B-3	Complete GIS and other automated inventories for stormwater, problem drainage areas, DFIRM and other City assets.	Flood	Engineering
B-4	Coordinate with Colorado Springs Utilities to review their current water conservation and drought programs.	Drought	CSU and OEM
B-5	Achieve and maintain a Class 6 rating in the Community Rating System (CRS) for floodplain management.	Flood	PPRBD and OEM
B-6	Review the Emergency Action Plans provided by Colorado Springs Utilities.	Dam & Levee Failure	OEM and CSU
B-7	Attend Emergency Action Plan exercises coordinated by Colorado Springs Utilities.	Dam & Levee Failure	OEM and CSU
B-8	Continue to develop programs and allocate resources for the reduction of fuels in potential wildfire areas. This includes continuing the Wildfire Mitigation program as well as organizing and providing resources that can be used to reduce natural fuels.	Wildfire	WM-Division of FM
B-9	Continue to develop partnerships with other organizations to implement wildfire mitigation plans and other hazard reduction programs.	Wildfire	WM-Division of FM
B-10	Complete and maintain the 2010 Community Wildfire Protection Plan including the assessment of parcels identified in the Wildland Urban Interface.	Wildfire	WM-Division of FM
B-11	Implement the actions identified in the 2010 Community Wildfire Protection Plan.	Wildfire	WM-Division of FM

Action #	Mitigation Action Description	Hazard	Responsible Agency
B-12	Work with the State Division of Water Resources to evaluate the dams that are not managed by Colorado Springs Utilities to determine high or significant impact and current conditions.	Dam & Levee Failure	OEM
Objective C: Build upon existing public outreach efforts to reduce risk and vulnerability to natural hazards.			
C-1	Collaborate with other stakeholders (public, businesses, non-profit organizations, government and regulatory agencies, and others) for public outreach efforts.	All Hazards	OEM
C-2	Continue the public outreach strategy to share responsibilities amongst the citizens, federal, state, and local governments.	All Hazards	OEM
C-3	Continue to operate the City's Office of Emergency Management natural hazards website.	All Hazards	OEM
C-4	Incorporate earthquakes in the Office of Emergency Management public outreach strategy.	Earthquake	OEM
Objective D: Leverage external financial assistance and other resources to strengthen the city's disaster resiliency.			
D-1	Continue to pursue additional grants to implement risk reduction projects.	All Hazards	OEM
Objective E: Continue to improve the regulatory review process for development and construction in the vicinity of known natural hazard areas.			
E-1	Continue to involve the Colorado Geological Survey in land use reviews and hazard assessments.	Landslide	Planning
Objective F: Continue to assess ongoing disaster preparedness programs that maintain or improve city preparedness.			
F-1	Achieve and maintain Emergency Management Accreditation Program certification.	All Hazards	OEM
F-2	Ensure the effectiveness of large-scale evacuation plans through full-scale tests.	Flood, Wildfire,	OEM
F-3	Maintain the programs and data outlined in the Special Needs Assessment and Plan.	All Hazards	OEM
F-4	Develop preparedness guides for Colorado Springs residents and businesses.	All Hazards	OEM
F-5	Continue to improve the communication of severe weather warnings, flood warning, and related information.	All Hazards	OEM
F-6	Prepare a feasibility study on updating the City's rain gauge automation system to the Gauge-Adjusted Radar Rainfall (GARR) System.	Flood	OEM
F-7	Consider the use of a resource management system to capture the financial data for natural hazard events.	All Hazards	OEM

This Plan update resulted in 29 mitigation actions which update, consolidate, and enhance the 39 mitigation actions developed in the 2005 PDMP. The City of Colorado Springs Pre-Disaster Mitigation Plan Update was adopted by the City Council on Qcnrck`cp 06*0./. and will be maintained and updated according to the plan maintenance structure summarized in Chapter 6. This Plan will be updated again within the next five years to maintain eligibility for the FEMA mitigation grant programs.

1. Introduction to Mitigation Planning

This chapter provides information on the purpose and participating jurisdictions for the City of Colorado Springs Pre-Disaster Mitigation Plan Update, describes federal hazard mitigation planning requirements and grant programs, and lists an outline of the Plan's organization. The 2010 Plan updates the City of Colorado Springs 2005 Pre-Disaster Mitigation Plan.

1.1 Plan Purpose and Participating Jurisdictions

The City of Colorado Springs prepared this local hazard mitigation plan to better protect the people and property within the City's jurisdiction from the impacts of natural hazard events. The 2005 plan was a single-jurisdiction plan. As part of the plan update process, the City Office of Emergency Management (OEM) determined that the plan update would be best as a single-jurisdictional plan.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." Mitigation creates safer communities by reducing loss of life and property damage. Hazard mitigation planning is the process through which hazards that threaten communities are identified and profiled, likely impacts of those hazards are assessed, and mitigation strategies to lessen those impacts are identified, prioritized, and implemented. The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

This plan demonstrates Colorado Springs' commitment to reducing risks from hazards and serves as a tool to help decision makers direct and coordinate mitigation activities and resources, including local land use policies.

1.2 Mitigation Planning Requirements

The Federal Disaster Mitigation Act of 2000 (DMA 2000) passed by Congress includes a mitigation planning section (322). This section emphasizes the need for State, Tribal, and local entities to coordinate mitigation planning and implementation efforts. In addition, it provides the legal basis for FEMA's mitigation plan requirements for mitigation grant assistance.

To implement these planning requirements, FEMA published an Interim Final Rule in the *Federal Register* on February 26, 2002 (FEMA 2002a), 44 CFR Part 201 with subsequent updates. 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 crosswalk, which is an official report card used by FEMA reviewers, for local hazard mitigation plans documenting compliance with 44 CFR§201.6.

Emergency Management Accreditation Program (EMAP)

In addition to FEMA requirements, the City of Colorado Springs also maintains standards as set forth in the Emergency Management Accreditation Program (EMAP), and is seeking certification. The following EMAP Standards are addressed through this PDM Plan Update:

4.3 Hazard Identification, Risk Assessment and Consequence Analysis

4.4 Hazard Mitigation

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

1.3 Grant Programs Requiring Hazard Mitigation Plans

Local hazard mitigation plans qualify communities for the following federal mitigation grant programs:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Severe Repetitive Loss (SRL)
- Repetitive Flood Claim (RFC)

The HMGP and PDM grant programs are authorized under the Stafford Act and DMA 2000, while the FMA, SRL, and RFC grant programs are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. The HMGP is a state competitive grant program for communities in areas covered by a recent disaster declaration. The PDM, FMA, RFC, and SRL programs are also competitive but are available on an annual basis and do not require a disaster declaration; they rely on specific pre-disaster grant funding sources. In 2008, FEMA combined the PDM program with the FMA, RFC, and SRL programs into a unified Hazard Mitigation Assistance (HMA) program application cycle. The intent of this alignment is to enhance the quality and efficiency of grant awards on an allocation and competitive basis to state and local entities for worthwhile, cost-beneficial activities designed to reduce the risks of future damage in hazard-prone areas. These grant programs were authorized prior to adoption of the 2005 PDMP, however the specifics of these programs were not described in that plan.

Disaster Funded Mitigation Assistance

Hazard Mitigation Grant Program (HMGP): Provides grants to States, Tribes, and local entities to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to purchasing supplies to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a disaster declaration is limited. The program may provide a state or tribe with up to 20 percent of the total disaster grants awarded by FEMA. The cost-share eligibility requirement for this grant is 75 percent federal/25 percent non-federal.

Hazard Mitigation Assistance Programs

Pre-Disaster Mitigation (PDM) Program: Provides funds to States, Tribes, and local entities, including public universities, for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The cost-share eligibility requirement for this grant is 75 percent Federal/25 percent non-Federal. There is approximately $50 million to $150 million available each year. Communities compete nationally for the funds although the State is guaranteed $500,000 in project dollars. So, it is expected that at least one community in Colorado will receive money; assuming approvable grant applications are received.

Flood Mitigation Assistance (FMA) Grant Program: The goal of the FMA grant program is to reduce or eliminate flood insurance claims under the National Flood Insurance Program (NFIP). Particular emphasis for this program is placed on mitigating repetitive loss properties. Repetitive loss properties are properties for which two or more NFIP losses of at least $1,000 each have been paid within any 10-year period since 1978. Grant funding is available for three types of grants, including planning, project, and technical assistance. Project grants, which use the majority of the program's total funding, are awarded to states, tribes, and local entities for planning and technical assistance and/or to apply mitigation measures to reduce flood losses to properties insured under the NFIP. The cost-share eligibility requirement for this grant is 75 percent federal/25 percent non-federal. In Colorado there is approximately $100K - $150K available annually state-wide. Communities must compete state-wide first and then nationally, if there is money left over in the system.

Repetitive Flood Claims (RFC) Program: Provides funding to reduce or eliminate the long-term risk of flood damage to residential and nonresidential structures insured under the NFIP that have had one or more claim payments for flood damages. All RFC grants are eligible for up to 100 percent federal funding. There is $100 million available each year. This is nationally competitive, for "small and impoverished" communities and only to mitigation properties with flood insurance that have previous flood claims.

Severe Repetitive Loss (SRL) Program: Provides funding to reduce or eliminate the long-term risk of flood damage to residential structures insured under the NFIP that have at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any 10-year period, and the cumulative amount of such claims payments exceeds $20,000; or for which at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any 10-year period. The cost-share eligibility requirement for this grant is 75 percent federal/25 percent non-federal.

1.4 Plan Organization

The City of Colorado Springs Pre-Disaster Mitigation Plan Update is organized as follows:

- **Prerequisites** include the City's resolution of adoption for the plan.
- **Executive Summary** provides a general summary of the Plan update document.
- **Chapter 1: Introduction** describes the plan's purpose, hazard mitigation planning requirements, and federal hazard mitigation grant programs.
- **Chapter 2: Community Profile** provides a general description of the City of Colorado Springs, including its location, geography, climate, history, population, economy, and government.
- **Chapter 3: Planning Process** describes the planning process used to develop the plan update, including how it was prepared, who was involved in the process, and how the public was involved.
- **Chapter 4: Risk Assessment** identifies and profiles the hazards that could affect the city and assesses vulnerability to those hazards. It provides an inventory of critical facilities and other community assets in the city, and describes land use and development trends. Chapter 4 also includes a capability assessment of the existing plans, programs, and policies in the city related to mitigation.
- **Chapter 5: Mitigation Strategy** identifies goals and actions to mitigate hazards in Colorado Springs based on the results of the risk assessment. The mitigation actions are analyzed and prioritized, including a status update on the mitigation actions identified in the 2005 PDMP. This chapter also includes an implementation strategy.
- **Chapter 6: Plan Maintenance** provides a formal process for monitoring, evaluating, and updating the plan; discusses how to incorporate the plan into existing planning mechanisms; and offers plans for continued public involvement.
- **Appendix A: Plan Review Crosswalk** includes a completed FEMA crosswalk for local hazard mitigation plans documenting compliance with 44 CFR§201.6.
- **Appendix B: Planning Process Documentation** compiles agendas, sign-in sheets, press releases, and other materials documenting the planning process.
- **Appendix C: Mitigation Action Evaluation** includes the worksheets used by the Planning Subcommittee to identify and prioritize mitigation actions.
- **Appendix D: Plan Maintenance Forms** provides a mitigation action progress reporting form and an annual plan review questionnaire to assist in evaluating and maintaining the plan as described in Chapter 6: Plan Maintenance.

- **Appendix E: Human-Caused Hazards Summary** includes a summary description of human-caused hazards addressed in the draft Colorado Springs Catastrophic Incident Plan.
- **Appendix F: Flood Hazard Modeling Results** includes the modeling results for flood hazards in the City of Colorado Springs. This includes mapping tiles for each identified floodplain for the 2-year, 10-year, 100-year, and 500-year flood events.
- **Appendix G: References** provides references for information sources cited in the plan and a list of key contacts, web resources, and acronyms used in the plan.

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2. Community Profile

This section describes the location, geography, climate, history, population, economy, and government of the City of Colorado Springs.

2.1 Location, Geography, and Climate

Location

The City of Colorado Springs is located in south-central Colorado between the foothills of the Rocky Mountains and the eastern plains of Colorado. Colorado Springs is approximately 60 miles south of Denver, in El Paso County. Colorado Springs' location within the state is illustrated in Figure 2-1.

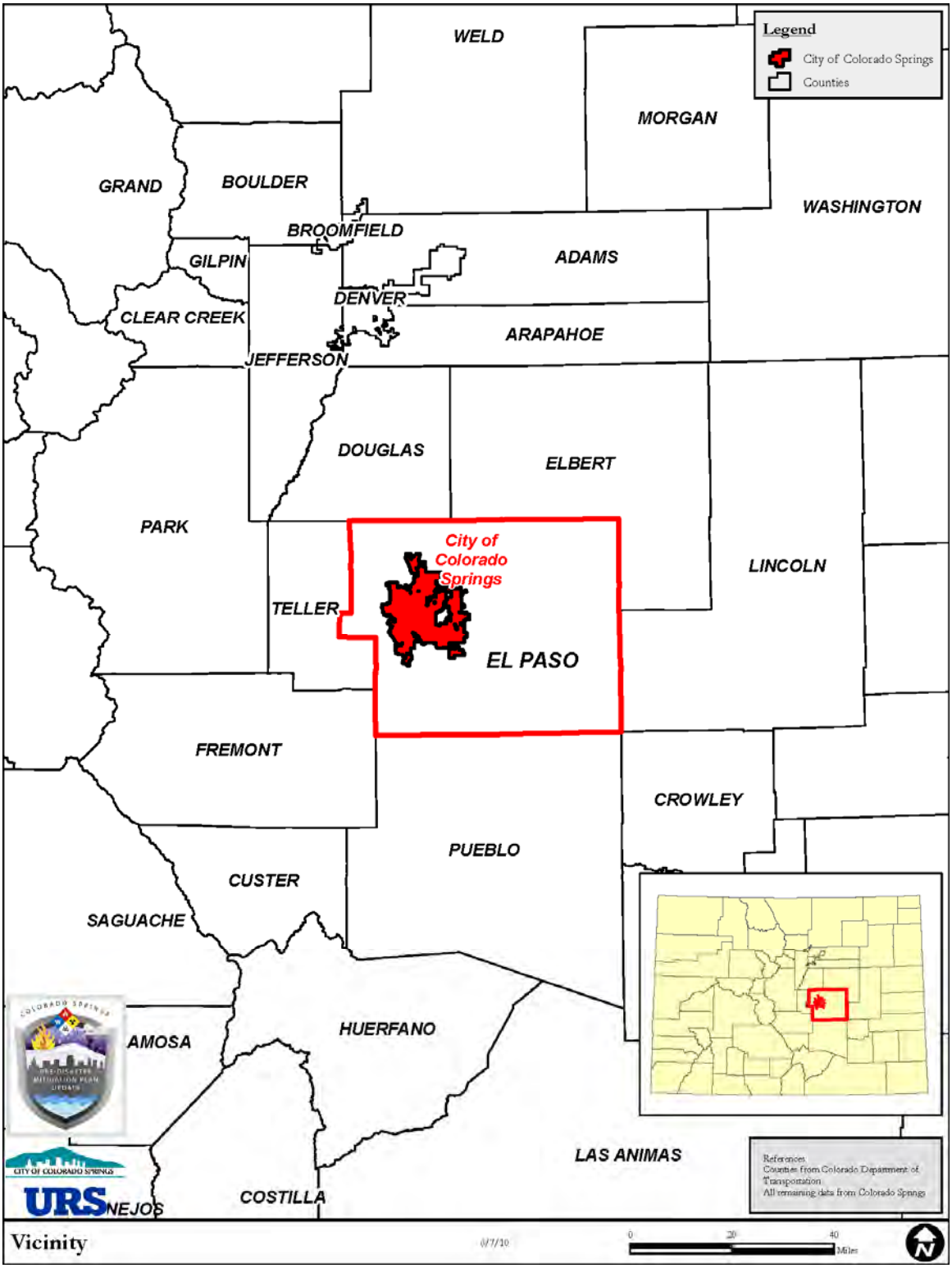
Geography

The City of Colorado Springs' geography is characterized by the transition between Colorado's western mountainous terrain and the rolling topography of the eastern plains. Portions of the western half of the city exist within the steep slopes abutting the Pike National Forest. The eastern half of the city consists of developed and vacant land on the typical grasslands and buttes of the Colorado plains.

Climate

Like much of the Colorado Front Range, Colorado Springs enjoys a mild climate, accompanied by an average of 127 sunny days per year (not including partly sunny or partly cloudy days). Average snowfall in the City of Colorado Springs is approximately 40 inches per year. Although snowstorms are fairly common in the city, the intensity of the Rocky Mountain sunshine typically quickly melts the snow and ice from the streets. The warmest month in Colorado Springs is July, with an average high temperature of 84.9 degrees. The coldest month is January, with an average high temperature of 42.5 degrees, and an average low temperature of 16.5 degrees. Colorado Springs receives approximately 16 inches of precipitation (including melted snowfall) per year on average. The highest precipitation is during the month of August, with 2.88 inches on average.

Figure 2-1: Map of Colorado Springs



Source: Created by URS, intended for planning purposes only.

2.2 History

This section was taken directly from the original 2005 PDMP:

Approximately 15,000 years ago, the first Native Americans may have appeared in Colorado. The earliest inhabitants were hunters and nomadic foragers on the plains, as well as the western plateau. Agricultural settlements began appearing along river valleys in the eastern part of Colorado from approximately 5,000 B.C. as people learned farming techniques from the Mississippi River Native Americans.

The first Europeans to venture into Colorado were the Spanish. In 1540-41, Coronado led an expedition north from Mexico in search of the Seven Cities of Cibola where the streets were allegedly paved with gold. Although this exact route is unknown, it is likely Coronado and his party passed through the present-day area of southeastern Colorado. Over the next 250 years, the Spanish made other expeditions into the Colorado area.

In 1800, Spain ceded a vast area, including Colorado, to Napoleon Bonaparte and the French. Three years later, the same parcel of land was sold by Napoleon to the United States as the "Louisiana Purchase". In 1806, President Jefferson commissioned Lieutenant Zebulon Pike to explore the recently purchased territory. Among the sites mentioned by Pike in his report of the expedition was the 14,110-foot peak, which today bears his name.

Historians estimate that approximately 50,000 people came to Colorado in search of gold in 1858-59. In 1861, a bill to create Colorado Territory was passed and President Lincoln appointed William Gilpin as the state's first territorial governor. The population of Colorado in 1861 was 21,000. The first legislature, sitting in Denver, selected Colorado City (west of present day Colorado Springs) as the capitol. The second legislature met there only a few days, in 1862, and adjourned to Denver. The assembly met in Denver and Golden up to 1867 when Denver was named the permanent seat of the territory. In 1876 - fifteen years after becoming a territory - that Colorado was admitted as the thirty-eighth state in the union. Colorado was called the "Centennial State" in honor of the one-hundredth year of the Declaration of Independence.

Originally called Fountain Colony, Colorado Springs was founded in 1871 by General William Jackson Palmer. His vision for this new city of Colorado Springs was one of culture, beauty, and a good quality of life at the foot of Pikes Peak. Colorado Springs became especially popular with the British and acquired the nickname Little London. Riding the rails, visitors came to see the area's beauty and were inspired to stay by a mild climate and the region's growing resort accommodations.

In the 1890s, Colorado Springs found it was surrounded by more than scenic wealth. Gold was discovered in nearby Cripple Creek in 1891, and Colorado Springs became a thriving financial center. The gold rush had a dramatic affect on Colorado Springs. Miners became millionaires, mansions were built and fortunes were spent all to the betterment of Colorado Springs. General Palmer's wisdom and planning along with the gold from Cripple Creek gave this beautiful city a wonderful legacy and many invaluable gifts. The city benefited in the form of office buildings, mansions, luxury hotels, parks and recreation, and a reputation of being a city of healthful and gracious living.

The golden years lasted until 1917, when the U.S. went to silver for its coinage and the local economy once again emphasized tourism. Looking to expand its economic base, the city offered land to the military in 1942. With the start of World War II, Fort Carson was established on 137,000 acres to the south of Colorado Springs. The military's presence grew in the 1950s with the

opening of the U.S. Air Force Academy. Over the next 30 years, Peterson Air Force Base, Cheyenne Mountain Air Force Station and Schriever Air Force Base helped create Colorado Springs' reputation as the nation's military space capital, housing the North American Aerospace Defense Command (NORAD), and other Space Command centers. Since September 11, 2001 US Northern Command (NORTHCOM) has been activated and located in Colorado Springs.

Manufacturing expanded tremendously when the area's quality of life and cost advantages were recognized in the 1960s and 1970s. Today, computers, electronic equipment, semiconductors, precision parts, plastics, equipment and countless other high-quality products are manufactured in the Pikes Peak region and shipped to national and international markets. The amateur sports segment is one of several service industries expanding in the region. Colorado Springs is home to the headquarters of the U.S. Olympic Committee and Olympic Training Center, the world's finest multi-sport training facility. Many other national nonprofit organizations have moved their headquarters to the Pikes Peak region.

Downtown Colorado Springs has experienced a revival, and a vibrant mixture of small business, parks, street art, professionals, and students creates a diverse and comfortable atmosphere. Colorado Springs has experienced dramatic changes in its history. Now military bases, high-tech companies, higher education facilities, and a thriving community of small businesses offer many opportunities here on the edge of the Rocky Mountains.[1]

2.3 Population

Colorado Springs is the second largest municipality in the State of Colorado with an estimated population of over 400,000 in 2008. Table 2-1 provides population estimates for Colorado Springs for the time period from 2000 to 2008. El Paso County, in which Colorado Springs resides, is expected to surpass Denver County in terms of population by the year 2035.[2] Figure 2-2: Population Density Map for Colorado Springs, February 2008 shows the population density for Colorado Springs, as of February 2008.

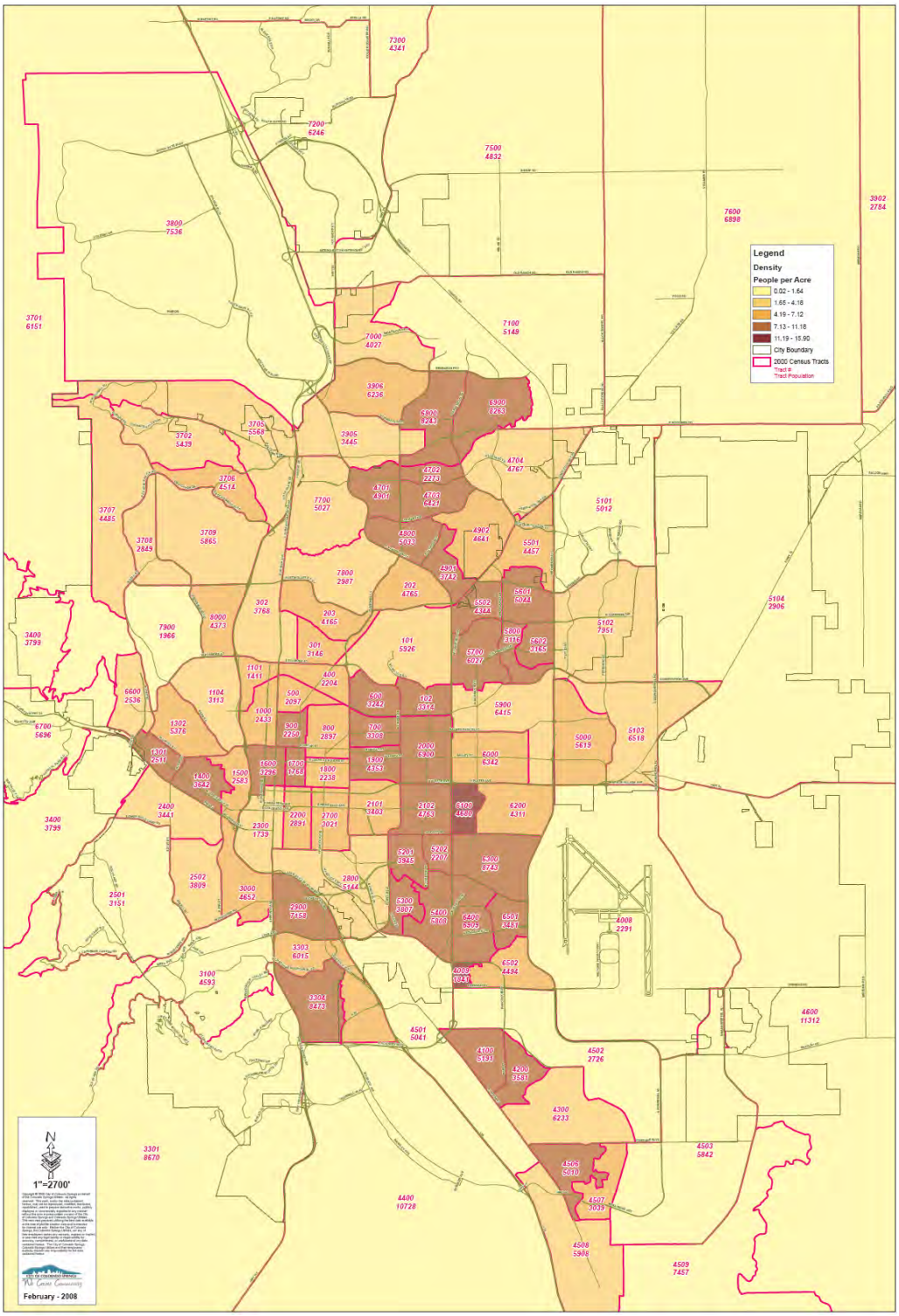
Table 2-1: City of Colorado Springs Population

Area	2000(census)	2008(est.)	Percent Change
City of Colorado Springs	360,890	400,411	11%
Colorado	4,301,261	5,011,390	16.5%

Source: US Census Bureau and State Demographers Office, 2010.

[1] Pre-Disaster Mitigation Plan for Colorado Springs, Colorado, March 2005.
[2] State Demographers Office, online at http://www.dola.colorado.gov/dlg/demog/population/forecasts/counties5yr.xls, accessed on March 12, 2010.

Figure 2-2: Population Density Map for Colorado Springs, February 2008



Source: City of Colorado Springs, http://www.springsgov.com/Files/tracts.pdf, accessed on November 19, 2009.

2.4 Economy

The largest major industry sector was the retail trade industry, with nearly 30,500 employees. Second to retail trade was the health care and social assistance industry, also with over 30,000 employees. Table 2-2 shows a list of major industries in Colorado Springs for the 4th quarter of 2008. The unemployment rate in January 2010 for the Colorado Springs MSA was 8.9%, compared to the national unemployment rate of 9.7%.[3]

Table 2-2: Industry Distribution for the Colorado Springs MSA

Industry	Establishments	Employees
Retail Trade (44 & 45)	1,992	30,499
Health Care and Social Assistance	1,673	30,192
Education Services	351	26,210
Accommodation and Food Services	1,293	25,813
Professional, Scientific & Technical Svc	3,170	22,656
Admin., Support, Waste Mgmt, Remediation	1,148	17,947
Construction	2,104	15,005
Manufacturing (31-33)	584	14,967
Public Administration	100	12,470
Finance and Insurance	1,145	11,722
Other Services (except Public Admin.)	1,321	9,420
Information	335	8,080
Wholesale Trade	880	6,004
Transportation and Warehousing (48 & 49)	361	5,424
Arts, Entertainment, and Recreation	285	4,737
Real Estate and Rental and Leasing	1,159	4,407
Utilities	46	2,780
Management of Companies and Enterprises	129	963
Agriculture, Forestry, Fishing & Hunting	36	224
Unclassified establishments	21	23

Source: Colorado Dept. of Labor, 2010.

In addition to those listed above, there are several active military installations in the Colorado Springs area that employ thousands. These include Peterson Air Force Base, Schriever Air Force Base, Fort Carson, NORAD, and others.

[3] Colorado Department of Labor at http://lmigateway.coworkforce.com and Bureau of Labor Statistics at http://data.bls.gov , both accessed on March 12, 2010.

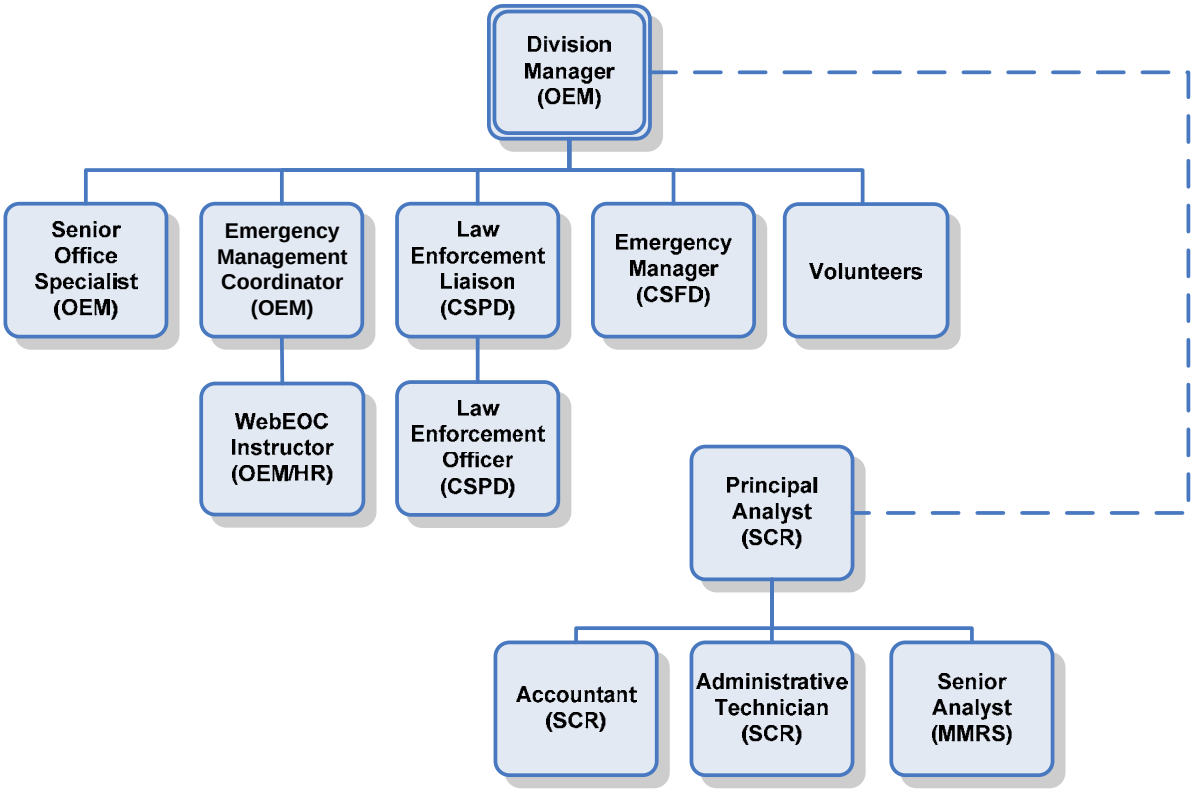
2.5 Government

The City of Colorado Springs incorporated on June 19, 1886. Colorado Springs is a home rule municipality meaning that it is self governing under the State Constitution, Colorado Revised Statutes, and the Home Rule Charter for Colorado Springs. The City operates as a mayor-council form of government. The City Council appoints several city officials including the City Manager, City Attorney, City Clerk, City Auditor, and Municipal Court Judges. Most of the city government is under the leadership of the City Manager, organized into departments or divisions, and led by directors. The City has 29 departments or agencies within its government, including the Citizen Service Center, City Attorney, City Auditor, City Clerk, City Engineering, City Manager, Colorado Springs Airport, Colorado Springs Pioneer Museum, Community Development, Community Infrastructure & Development, Economic Development, Emergency Management, Financial & Administrative Services, Financial Services, Fire, Human Resources, Information Technology, Land Use Review, Municipal Court, Parking System, Parks, Recreation & Cultural Services, Pikes Peak America's Mountain, Police, Procurement Services, Public Communications, Revenue & Collections, Stormwater, Streets, and Transit Service[4].

Prior to 1988, emergency management services were performed by the Disaster Emergency Service Agency, administered by El Paso County. In 1988, by council direction, the Fire Chief for the City initiated bringing emergency management services in-house. The Pikes Peak Metropolitan Medical Response System (MMRS) was contracted to the City of Colorado Springs in 2001. The Colorado Springs Office of Emergency Management is structured as shown in Figure 2-3.

[4] According to the City of Colorado Springs website www.springsgov.com, accessed on June 16, 2010.

Figure 2-3: Colorado Springs Office of Emergency Management Organization



Source: Colorado Springs Office of Emergency Management, May 2010.

Although there are several references to El Paso County (when data was only available at the county level) throughout this Plan Update, it should be clear that this Plan only applies to the City of Colorado Springs and is administered by the City of Colorado Springs Office of Emergency Management.

3. Planning Process

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

3.1 Pre-Disaster Mitigation Planning Subcommittee

City of Colorado Springs contracted with URS Corporation (URS) in October 2009 to assist in updating their pre-disaster mitigation plan by facilitating the hazard mitigation planning process and developing the plan document. The City of Colorado Springs Office of Emergency Management (OEM) and URS worked together to convene the Planning Subcommittee to guide the planning process and make key decisions. An invite list for the Planning Subcommittee is included in Appendix B: Planning Process Documentation. The agencies that participated in the Planning Subcommittee are listed in Table 3-1.

In the planning process for the 2010 update, the Planning Subcommittee reviewed and updated each of the sections of the previously approved 2005 plan, including improving organization and formatting and adding substantially more in-depth information specific to the City of Colorado Springs. The process for updating each section is described in the planning process steps in Section 3.2, as well as in each relevant Plan chapter. The Plan update preparation process was similar to that of the 2005 PDMP in that the city formed a team, included the public and state and federal agencies, pulled information from other various sources and stakeholders, and reviewed drafts of the document to help inform the overall Plan update. This Plan update built upon the success of the 2005 process.

The City of Colorado Springs is concurrently preparing a Catastrophic Incident Plan. Relevant portions of that plan draft are incorporated in this Plan, such as the human-caused hazards summary provided in Appendix E.

Table 3-1: Planning Subcommittee Participants

Agencies that participated in the Colorado Springs PDM Planning Subcommittee:
Colorado Springs Office of Emergency Management
Colorado Springs Fire Department
Colorado Springs Police Department
Colorado Springs Land Use Review
Colorado Springs Stormwater Engineering
Colorado Springs Utilities
Pikes Peak Regional Building Department
Pikes Peak Metropolitan Medical Response System
El Paso County Office of Emergency Management

To ensure adequate participation in plan development, Planning Subcommittee members were asked to do the following:

- Attend and participate in meetings
- Collect risk assessment data
- Make decisions on plan process and content
- Complete homework assignments
- Submit mitigation action implementation worksheets
- Coordinate and assist with the public outreach strategy
- Review plan drafts
- Coordinate the final adoption of the plan

The Colorado Springs Pre-Disaster Mitigation Plan Update (Plan) was prepared over eight months. Table 3-3 lists the dates and agenda items for the meetings of the Planning Subcommittee. Full agendas and sign-in sheets are included in Appendix B: Planning Process Documentation.

3.2 10-Step Planning Process

FEMA Requirement

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.

The Planning Subcommittee used FEMA's 10-step planning process integrating recommendations from FEMA's *Local Multi-Hazard Mitigation Planning Guidance* (2008), the Local Mitigation Planning How-To Guides, and the 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Table 3-2 shows how the modified 10-step process corresponds with the planning requirements of the Disaster Mitigation Act.

Table 3-2: 10-Step Planning Process Used to Develop the Plan

Disaster Mitigation Act Requirements 44CFR 201.6	Modified CRS Planning Steps
Phase I: Organize Resources	
201.6(c)(1)	Step 1: Organize the Planning Effort
201.6(b)(1)	Step 2: Involve the Public
201.6(b)(2) and (3)	Step 3: Coordinate with Other Departments and Agencies
Phase II: Assess Risks	
201.6(c)(2)(i)	Step 4: Identify the Hazards
201.6(c)(2)(ii)	Step 5: Assess the Risks
Phase III: Develop the Mitigation Plan	
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
Phase IV: Implement the Plan and Monitor Progress	
201.6(c)(5)	Step 9: Adopt the Plan
201.6(c)(4)	Step 10: Implement, Evaluate, and Revise the Plan

Source: FEMA Local Multi-Hazard Mitigation Planning Guidance, 2008

The following section provides a narrative description of the planning process.

Phase I: Organize Resources

Step 1: Organize the Planning Effort

The planning process began with a kickoff meeting on October 6, 2009. During the kickoff meeting, URS presented information on the scope and purpose of the plan, participation requirements of the Planning Subcommittee and the City of Colorado Springs, and an overview of the planning process and schedule. URS and the Colorado Springs OEM discussed ideas for involving the public (Step 2) and coordination with other agencies and departments (Step 3).

Table 3-3: Colorado Springs Pre-Disaster Mitigation Planning Meetings

Date	Meeting Type and Agenda
October 6, 2009	**Project Kick-off Meeting:** • Introduce the Disaster Mitigation Act of 2000 and purpose and requirements of hazard mitigation planning; • Discuss requirements and expectations for participation on the Planning Subcommittee; • Discuss public outreach strategies; • Begin hazard identification and data collection process; and • Share expectations for the planning process and results.
December 16, 2009	**Planning Subcommittee Meeting #1:** • Introduce the Disaster Mitigation Act of 2000 and purpose and requirements of hazard mitigation planning; • Discuss the planning process and the public outreach requirements and strategies; • Review hazards and data sources; and

	• Distribute homework regarding capability assessment.
February 16, 2010	**Planning Subcommittee Meeting #2:** • Review results of risk assessment; • Review and refine mitigation goals; • Review, refine, and introduce objective and actions; • Prioritize mitigation actions; and • Distribute homework regarding critical facilities.

Step 2: Involve the Public

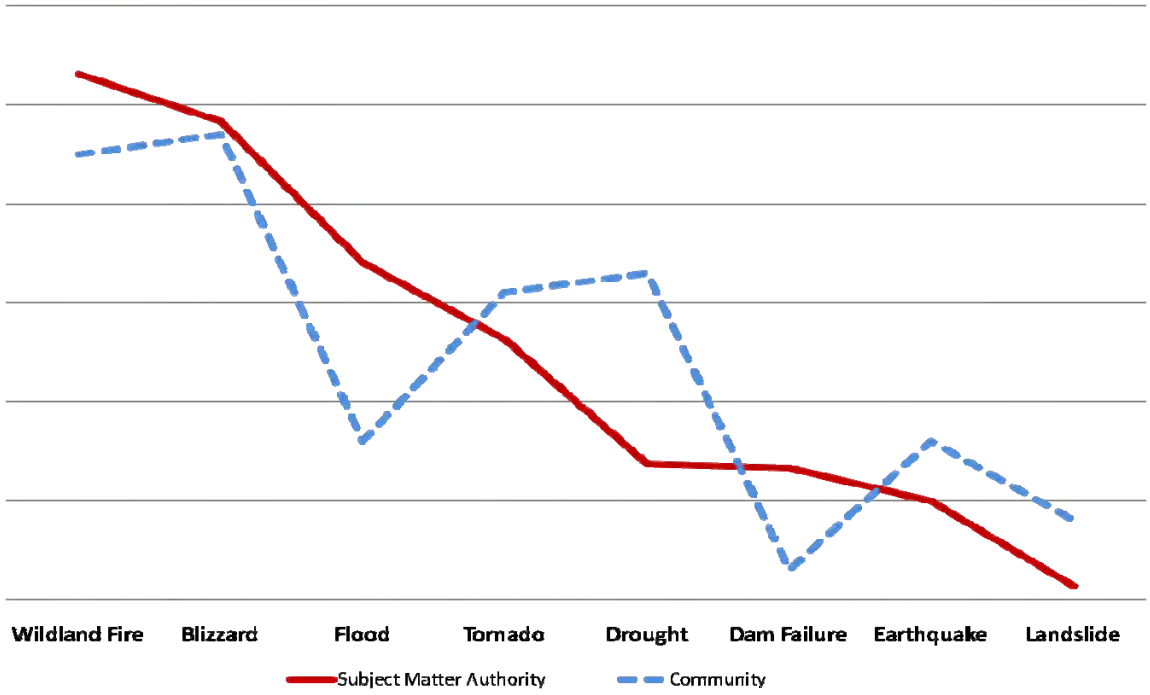
FEMA Requirement

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

At their first two meetings, the Planning Subcommittee discussed different options for involving the public in the hazard mitigation planning process and finalized the following outreach plan.

Public Input Survey*:* The City of Colorado Springs OEM conducted an incented online community survey using a sample size of 411 with a 100% return in October 2009. The survey was conducted in 12 of the most populated areas of the city with near equal participation from each area. In addition to the public surveys, 55 Subject Matter Authorities (SMAs) were surveyed in August 2009. Figure 3-1, below, summarizes the perceived threat for particular natural hazards in Colorado Springs according to both the community and the SMAs.

Figure 3-1: Perceived Threat to Natural Hazards in Colorado Springs – Community vs. SMAs



City of Colorado Springs City Council Presentation: The Office of Emergency Management provided an informational report to the Colorado Springs City Council on January 25, 2010. This included a PowerPoint presentation on the benefits of mitigation planning, FEMA requirements, example mitigation projects, and the remaining steps to complete the project. The agenda for this meeting is included in Appendix B.

Pikes Peak Area Council of Governments (PPACG) Presentations: The Office of Emergency Management provided an informational briefing to the PPACG Board of Directors on March 10, 2010. The Agenda and materials from this presentation are included in Appendix B. On March 31, 2010 the Office of Emergency Management presented a PDMP status update to the PPACG Community Advisory Committee.

City of Colorado Springs Council of Neighborhood Organizations (CONO) Presentation: CONO is comprised of approximately 175 neighborhood organizations and HOAs in Colorado Springs with the mission of serving and preserving the neighborhoods in the city. The Office of Emergency Management provided an informational briefing to the general membership group on March 2, 2010. The sign-in sheet from this meeting is included in Appendix B.

City of Colorado Springs Community Briefing: The Office of Emergency Management provided a community-wide briefing to the public on February 16, 2010 at Fire Station 20. This meeting was open to all interested parties, and advertised in three local publications. The newspaper notifications for this event are included in Appendix B.

Public Review of Plan Drafts: The draft risk assessment was posted on the Colorado Springs OEM website on February 9, 2010 and was available for online public review until the entire PDMP Update was posted in April 2010. After comments from the Planning Subcommittee were incorporated into a draft update of the pre-disaster mitigation plan, it was made available for public review and comment. Members of the committee worked together to make the plan for public review in hard copy from April 19, 2010 through May 3, 2010, at the following locations:

Location 1: The City of Colorado Springs Office of Emergency Management, 375 Printers Parkway
Location 2: The City of Colorado Springs Land Use Review, 30 S. Nevada Ave. Ste. 105

The draft plan was also available for electronic review on the City of Colorado Springs Office of Emergency Management site at: *www.springsgov.com* from April 19, 2010 to present (as of May 19, 2010).

The Colorado Springs OEM publicized the availability of the draft plan by issuing press releases to the *Colorado Springs Gazette* and the *Colorado Springs Independent*. Copies of the notifications are included in Appendix B. No public comments were received during the review period.

Step 3: Coordinate with Other Departments and Agencies

Colorado Springs Office of Emergency Management invited a range of local, state, and Federal departments and agencies and other interested parties to be involved in the planning process. The Planning Subcommittee invited some of these additional stakeholders to 1) complete the public input survey and 2) review and comment on the plan draft. These additional stakeholders included the following:

- City of Colorado Springs City Council
- City of Colorado Springs Economic Development
- City of Colorado Springs GIS/IT
- City of Colorado Springs Road and Bridge
- Colorado Geological Survey
- El Paso/Teller County E-911
- School District 20
- United States Air Force Academy – Medical
- Memorial Hospital
- Penrose Hospital – Security
- School District 11
- Red Cross
- Peak Vista Community Health
- El Paso County Department of Health and Environment
- University of Colorado at Colorado Springs
- Peterson Air Force Base - Security

- Colorado State Forest Service
- Colorado Department of Transportation
- Colorado State Patrol
- US Forest Service/BLM
- US Army Corps of Engineers
- US Fish and Wildlife
- FEMA Region VIII
- National Weather Service
- El Paso County Office of Emergency Management
- University of Colorado at Colorado Springs

Incorporation of other plans and studies

As part of the coordination with other departments and agencies, URS and the Planning Subcommittee reviewed and incorporated existing plans, studies, reports, and technical information. This information was used in the development of the hazard identification, vulnerability assessment, and capability assessment in Chapter 4 and in the formation of goals, objectives and mitigation actions in Chapter 5. These sources are documented throughout the Plan and in Appendix G: References. The plans and studies specific to Colorado Springs included the following:

- Pre-Disaster Mitigation Plan for Colorado Springs, March 2005
- City of Colorado Springs DRAFT Community Wildfire Protection Plan 2010
- Colorado Springs Wildfire Mitigation Plan 2001
- DRAFT Colorado Springs Catastrophic Incident Plan (CAT Plan)
- Emergency Operations Plan (EOP)
- Colorado Springs Capital Improvements Program (CIP)
- Flood Insurance Studies (amended 1997)
- Drainage Basin Planning Studies
- Geo-Hazard Ordinance
- Non-combustible Roof Ordinance
- City of Colorado Springs Comprehensive Plan
- City of Colorado Springs Subdivision Code
- City of Colorado Springs Zoning Code
- City of Colorado Springs Hillside Manual
- Colorado Springs Utilities Water Conservation Plan

Phase II: Assess Risks

Step 4: Identify the Hazards

At Planning Subcommittee Meeting #1, URS presented information on the requirements for the risk assessment section of the hazard mitigation plan. Planning Subcommittee participants reviewed the list of hazards that FEMA recommends for consideration in mitigation planning and discussed the past and potential impacts of these hazards on the city. The Planning Subcommittee agreed to eliminate three hazards due to low risk and insufficient data and due to lack of relevance with this plan's purpose and scope (avalanche, expansive soils, and extreme heat). Section 4-2 describes the hazards that impact the City of Colorado Springs.

Step 5: Assess the Risks

A profile of each identified hazard was created using available GIS data, online data sources, and existing plans and reports. The profiles included a hazard description, geographic location, past occurrences, probability of future occurrences, and magnitude/severity (extent) for each hazard. Members of the Planning Subcommittee used a worksheet to provide information to URS about hazard data sources and past events in the city. The profiles also describe overall vulnerability to each hazard and identify structures and estimate potential losses to structures in identified hazard areas.

Members of the Planning Subcommittee also completed a 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 Plan update includes information on the City of Colorado Springs' regulatory, personnel, fiscal, and technical capabilities, as well as ongoing initiatives related to interagency coordination and public outreach. This capability assessment is summarized in Section 4.18. The draft risk assessment was posted online at *www.springsgov.com* for public review prior to developing the mitigation strategy.

Phase III: Mitigation Strategy

Step 6: Set Goals

At Planning Subcommittee Meeting #2, URS provided an overview of the mitigation strategy and the goals of the 2005 Colorado Springs Pre-Disaster Mitigation Plan, as well as the Colorado State Natural Hazards Mitigation Plan. The Planning Subcommittee discussed the goals to be included in this plan update and listed possible objectives and mitigation actions.

Step 7: Review Possible Activities

The Planning Subcommittee identified and prioritized mitigation actions at Planning Subcommittee Meeting #2. Details on this process are included in Chapter 5. Mitigation Strategy. The Planning Subcommittee identified the responsible agency and completed an implementation worksheet for each mitigation action. The purpose of these worksheets is to document background information, ideas for implementation, alternatives, responsible offices, partners, potential funding, cost estimates, benefits, and timeline for each identified action.

Step 8: Draft the Plan

URS developed a draft of the plan update document for review by the Planning Subcommittee. The draft was made available online and in hard copy for review and comment by the public and other agencies and interested stakeholders. This review period was from April 19, 2010 through May 3, 2010. 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 Emergency Management, Colorado Water Conservation Board, and FEMA Region VIII.

Phase IV: Plan Maintenance

Step 9: Adopt the Plan

The Colorado Springs City Council adopted the Plan September 28, 2010. A copy of the resolution of adoption is included in the Prerequisites section of the Plan.

Step 10: Implement, Evaluate, and Revise the Plan

The Planning Subcommittee developed and agreed upon 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.

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4. Risk Assessment

FEMA Requirements

Requirement §201.6(c)(2)(i): The risk assessment *shall* include a description of the types of all natural hazards that can affect the jurisdiction.

Requirement §201.6(c)(2)(i): The risk assessment *shall* include a description of the 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.

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.

EMAP Standards

Standard 4.3.1: The program shall identify the natural and human-caused hazards that potentially impact the jurisdiction using a broad range of sources. The program shall assess the risk and vulnerability of people, property, the environment and the program/entity operations from these hazards.

Standard 4.3.2: The program shall conduct a consequence analysis for the hazards identified in 4.3.1 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 hazards that affect the City of Colorado Springs and assesses vulnerability to those hazards. The risk assessment allows Colorado Springs to better understand its risks and provides a framework for developing and prioritizing mitigation actions to reduce risk from future natural hazard events.

This risk assessment chapter is organized as follows:

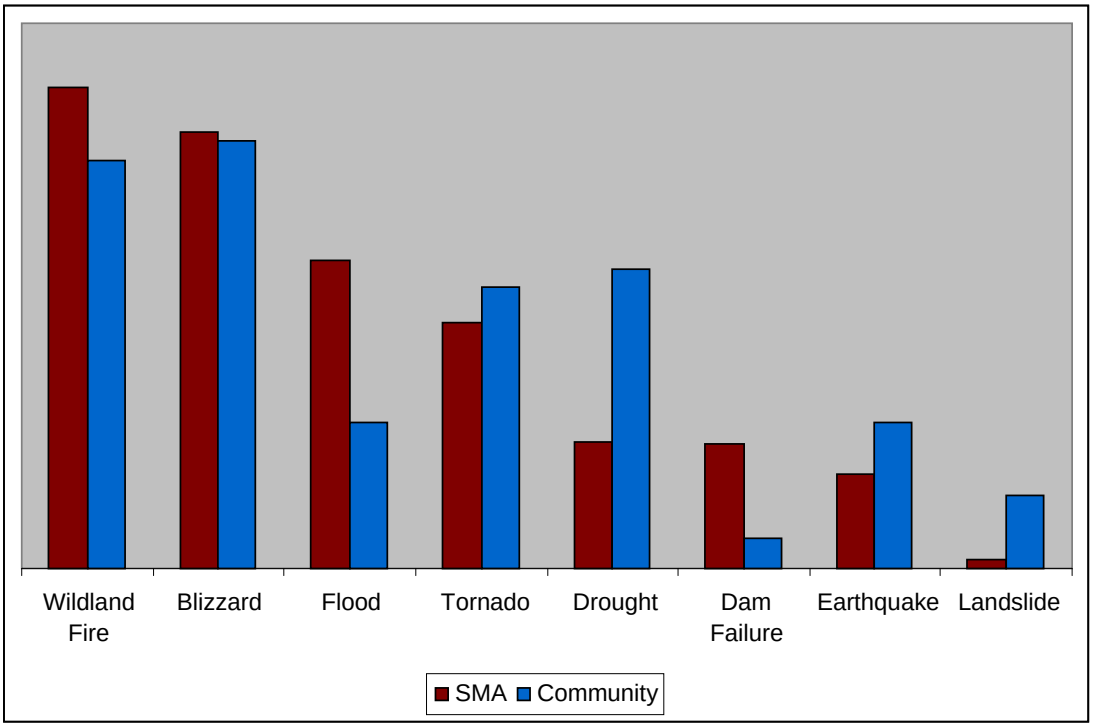
- **Section 4.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- Hazard profiles in **Section 4.2** through **Section 4.13** describe the location of the hazard in the planning area, previous 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.
- **Section 4.14 Hazard Profile Summary** assesses the city's total exposure to natural hazards and considers assets and populations at risk, including critical facilities and infrastructure; natural, historic, and cultural resources; economic assets; and socioeconomic variables.
- **Section 4.15 Community Asset Inventory** and **Section 4.17 Land Use and Development Trends** analyze trends in population growth, housing demand in hazard areas, and land use patterns.
- **Section 4.18 Capability Assessment** identifies the existing programs, policies, and plans that mitigate or could be used to mitigate risk of natural hazards.

4.1 Hazard Identification

This section identifies the hazards that are likely to affect Colorado Springs. The Planning Subcommittee considered the hazards identified in the State of Colorado Natural Hazards Mitigation Plan (2007), the hazards recommended by the Federal Emergency Management Agency (FEMA publication 386-2, *Understanding Your Risks: Identifying Hazards and Estimating Losses* (2002), and the hazards identified in the original pre-disaster mitigation plan (2005). This section addresses EMAP Standard 4.3.1 by identifying the hazards using a broad range of sources.

Figure 4-1, below, illustrates the results of a community survey conducted by the Colorado Springs Office of Emergency Management in 2009. It compares the perceived threat to natural hazards from two perspectives: 1) local emergency management professionals and other stakeholder experts, known as Subject Matter Authorities (SMA), and 2) a random sample of city residents, known as the Community.

Figure 4-1: Perceived Threat of Natural Hazards, Colorado Springs 2009



Source: URS, Recreated from survey results gathered by the Colorado Springs Office of Emergency Management, 2009.

The survey results indicate that both the SMAs and the community perceive wildland fire and blizzards as the top two natural hazard threats to Colorado Springs. The figure also shows that the community is less concerned about flooding and more concerned about drought than the experts.

The Planning Subcommittee also reviewed events that triggered federal and/or state disaster declarations. Disaster declarations are typically made at the county level and may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration. FEMA also issues emergency declarations, which are more limited in scope and do not warrant the long-term federal recovery programs of major disaster declarations.

Table 4-1 lists state, federal, and local disaster declarations in which El Paso County was a designated county. Many of these declarations were for flooding and severe storms, and two were related to wildfires.

Table 4-1: Disaster Declaration History in El Paso County, 1965-2008

Year	Event Type	Type of Declaration
1965	Tornadoes, Severe Storms, & Flooding	Presidential Disaster
1969	Severe Storms & Flooding	Presidential Disaster
1973	Heavy Rains, Snowmelt, & Flooding	Presidential Disaster
1976	Severe Storms & Flash Flooding	Presidential Disaster

Year	Event Type	Type of Declaration
1989	Wildfires	Local
1990	Tornado	State
1993	Flooding	Local
1995	Wildfire	Local
1995	Flooding/Landslides	State
1997	Snow Emergency	State
1999	Colorado Severe Storms, Flooding, Mudslides, and Landslides	Presidential Disaster
2001	Severe Weather	Presidential Disaster
2007	Snow	Presidential Emergency

Source: State of Colorado Natural Hazards Mitigation Plan; Public Entity Risk Institute Presidential Disaster Declaration Site, www.peripresdecusa.org/mainframe.htm, November 12, 2009.

United States Department of Agriculture (USDA) Disaster

A USDA disaster declaration certifies that the affected county has suffered at least a 30 percent loss in one or more crop or livestock areas and provides affected producers with access to low-interest loans and other programs to help mitigate the impact of the drought. All counties neighboring those receiving disaster declarations are named as contiguous disaster counties and are eligible for the same assistance in accordance with the Consolidated Farm and Rural Development Act.

As shown in the following table, from 2005 to 2007, the Farm Service Agency of the USDA issued eight disaster declarations affecting El Paso County, Colorado. Most of these declarations resulted from either periods of drought, or severe winter storms.

Table 4-2: Farm Service Agency Disaster Designations, El Paso County 2005-2007

Year	Hail	Drought	Insects	Wildfires	High Winds	Excessive Heat	Below Normal Temp.	Winter Storms	Excessive Moisture
2005		✓							
2005	✓				✓				✓
2006							✓	✓	
2006		✓		✓	✓	✓			
2006		✓	✓		✓	✓		✓	
2006									✓
2006		✓							
2007							✓	✓	

Source: USDA Farm Service Agency, www.fsa.usda.gov/Internet/FSA_File/2005_2007eligible_county.xls, accessed January 2010

The 2005 Plan identified flooding, wildfire, landslides, and severe weather as posing the most risk to Colorado Springs. The 2010 Plan Update profiles the same hazards identified in the 2005 Plan, with the addition of windstorms and dam and levee failure.

Table 4-3: Hazards Identified in the 2005 PDM Plan and 2010 Update

2005 PDM Plan	2010 Plan Update

Flood *	Flood
Wildfire *	Wildfire
Landslides *	Landslides
Severe Weather (included Hail, Lightning, Tornadoes, Heavy Snow, and Ice Storms) *	Hail
	Lightning
	Tornadoes
	Severe Winter Storms
Drought	Drought
Earthquake	Earthquake
	Windstorms
	Dam and Levee Failure

* Identified as primary hazard as posing the highest risk to Colorado Springs in the original PDM Plan (2005).

2008 hazardous weather in Colorado resulted in:

- 12 deaths
- 100 injuries
- $166,590,000 in total damages [5]

Planning Continuity

The PDM Update primary focus is to assess and provide mitigation strategies for natural hazards. To ensure planning continuity in follow-on planning work such as, the Catastrophic Incident Plan, Continuity of Operations, Continuity of Government and Emergency Operations Plan (EOP) update, the PDM Update seeks to introduce Human-Caused hazards into the pre-disaster mitigation planning cycle (FEMA State and Local Guidance for Integrating Manmade Hazards into Mitigation Planning September 2003, version 2). The following human-caused hazards are summarized in Appendix E - Human-Caused Hazards Summary:

- Explosion
- Chemical, Biological, Radiological, Nuclear and Explosion (CBRNE) – Chemical (all)
- CBRNE – Biological (all)
- CBRNE – Radiological
- Cyber
- Disease – Infectious Disease

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, are listed in Table 4-4 along with an explanation.

[5] 2008 Summary of Hazardous Weather Fatalities, Injuries, and Damage Costs by State, National Weather Service, http://www.nws.noaa.gov/om/hazstats/state08.pdf accessed on November 19, 2009.

Table 4-4: Hazards Not Profiled in Plan

Hazard	Explanation for Omission
Avalanche	An avalanche forecasting area is defined surrounding Pikes Peak; however, no previous occurrences in Colorado Springs were discovered through research of this hazard, nor are any expected to occur within the city limits.
Expansive Soils	Although some underlying swelling clays may exist in Colorado Springs, the overall impacts are negligible and are mitigated through existing development policies and practices.
Extreme Heat	This hazard has not created problems in the past that are unrelated to drought. It is primarily an issue of human and livestock health. Since 1995, there were no recorded deaths in Colorado caused by extreme heat (per the National Weather Service).

4.2 Hazard Profiles and Vulnerability

Each of the hazards identified as posing a threat in Colorado 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.

The sources used to collect information for the hazard profiles include, but are not limited to the following:

- State of Colorado Natural Hazards Mitigation Plan (2007);
- Pre-Disaster Mitigation Plan for Colorado Springs (2005);
- Information gathered from the City of Colorado Springs website;
- Information on past hazard events from the Spatial Hazard Event and Loss Database; (SHELDUS), a component of the University of South Carolina Hazards Research Lab, that compiles county-level hazard data for 18 natural hazard event types;
- Information on past extreme weather and climate events from the National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC);
- Disaster declaration history from FEMA, the Public Entity Risk Institute (PERI), and the U.S. Department of Agriculture (USDA) Farm Service Agency;
- Information on Natural Hazards gathered from the United States Geological Survey (USGS);
- Information on Natural Hazards gathered from the Colorado Geological Survey (CGS);
- Information on mitigation and previous events from the Colorado Water Conservation Board (CWCB);
- Information on drought occurrences from the National Drought Mitigation Center (NDMC);
- Geographic information systems (GIS) data from the City of Colorado Springs;
- Existing plans and reports; and
- Meetings and data collected from the Planning Subcommittee.

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

Hazard Description provides a general description of the hazard and considers the relationship between hazards. Descriptions of the hazards are more in-depth than what was provided in the 2005 PDMP.

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.

Previous Occurrences includes information on the known hazard incidents and includes information related to the impact of those events, if known. Information from the 2005 PDMP was used in addition to numerous other resources to build upon the event history for this Plan update.

It is important to note that SHELDUS data provides information on a county-average basis. The number of injuries, fatalities, and property damages associated with a particular event are equally distributed amongst the affected counties for that hazard event. For example, if 5 deaths were attributed to a blizzard that affected 20 counties, then each county would show 0.25 deaths for that event.

Probability of Future Occurrence uses the frequency of past events to estimate the likelihood of future occurrence. Probability was described more quantitatively in this Plan update than the 2005 PDMP. The 2005 PDMP more generally described probability in terms of whether or not the city expects the event to occur often or not. For this update, the probability, or chance of occurrence, was calculated based on existing data. The probability 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 percent chance of a drought occurring in any given year.

Based on historical data, the probability of future occurrences is categorized as follows:

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

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.

Magnitude and severity is categorized as follows:

- *Catastrophic:* extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, and/or 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

- *Critical:* Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours
- *Limited:* Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours
- *Negligible:* No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services

The Planning Subcommittee used discretion to modify some of the probabilities and magnitudes when necessary.

Vulnerability Assessment describes the city's overall vulnerability to each hazard; identifies existing and future structures, critical facilities, and infrastructure in identified hazard areas; and estimates potential losses to vulnerable structures, where data is available. This Plan update utilized FEMA's HAZUS software for estimating losses attributed to flooding and earthquakes. The 2005 PDMP used the available data at the time to estimate losses, identify assets, and analyzing development trends. This Plan update built upon that process by utilizing new city data as well as a myriad of other sources that may not have otherwise been available during the development of the 2005 PDMP. This section meets the intent of EMAP Standards 4.3.1 and 4.3.2 by assessing the vulnerability of people, property, and the environment from these hazards.

Data Limitations makes note of where the Planning Subcommittee encountered data limitations when completing the hazard profile.

4.3 Dam and Levee Failure

Hazard Description

Dams are manmade structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. Dams typically are constructed of earth, rock, concrete, or mine tailings. Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of development and infrastructure located downstream. Dam failures can result from any one or a combination of the following causes: overtopping caused by floods that exceed the capacity of the dam, deliberate acts of sabotage, structural failure of materials used in dam construction, movement and/or failure of the foundation supporting the dam, settlement and cracking of concrete or embankment dams, piping and internal erosion of soil in embankment dams, or inadequate maintenance and upkeep.[6]

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:

- **High Hazard Potential**: Probable loss of life (one or more)

[6] FEMA, Why Dams Fail, http://www.fema.gov/hazard/damfailure/why.shtm, accessed on November 25, 2009.

- **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

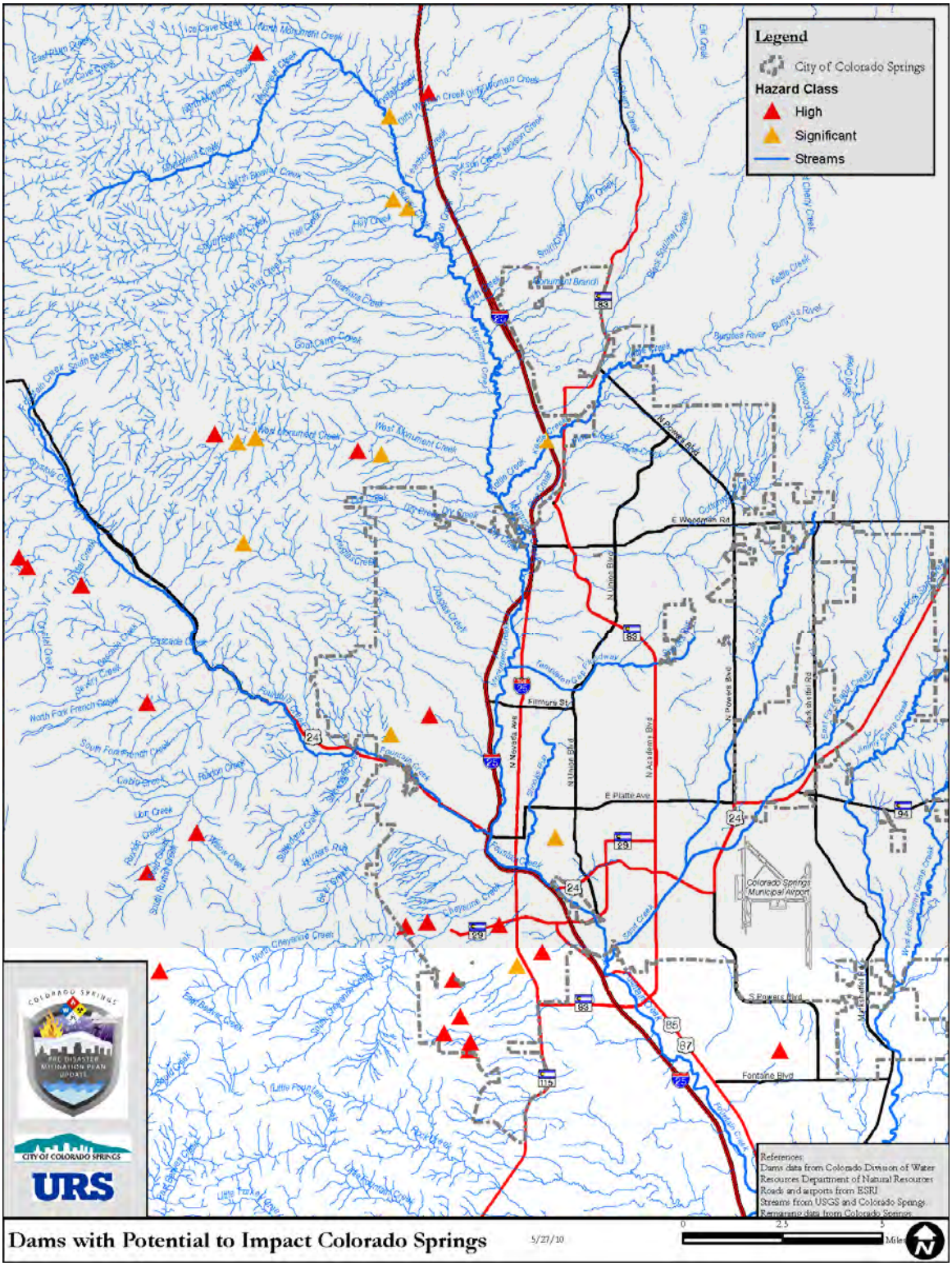
Levees are usually earthen embankments designed to contain, control, or divert the flow of water to provide some level of protection from flooding. Some levee systems were built for agricultural purposes and provide flood protection and flood loss reduction for farm fields and other land used for agricultural 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 are designed to provide a specific level of flood protection. Agricultural levee systems provide a level of protection that is appropriate based on the value of the assets being protected. Urban levee systems, because they are designed to protect urban areas, have typically been built to higher standards. 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).

Geographic Location

There are 33 dams that could potentially impact the City of Colorado Springs if the dam were breached. Of these, 22 of them are rated as high hazard potential by the State Department of Natural Resources – Dam Safety Branch. The other 11 dams are rated as a significant hazard potential.

Figure 4-2: Dams with Potential to Impact Colorado Springs



Source: Created by URS for planning purposes only, 2010

All dams with either a significant or high hazard potential are required to maintain an Emergency Action Plan. An Emergency Action Plan 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 following table lists all of the dams that could potentially impact the City of Colorado Springs.

Table 4-5: Dams with Potential to Impact City of Colorado Springs

Name	Hazard Classification	Inspection Date	Owner
BIG TOOTH	High	16-Jul-09	COLORADO SPRINGS UTILITIES
CRYSTAL CREEK	High	15-Oct-09	COLORADO SPRINGS UTILITIES
FISHER CANON	High	16-Nov-07	COG LAND and DEVELOPMENT CO.
FISHERS CANYON DEBRIS BASIN	High	12-Jul-07	BROADMOOR RESORT COMMUNITY HOA
FOUNTAIN VALLEY NO 2	High	12-May-09	FOUNTAIN MUTUAL IRRIGATION CO.
GOLD CAMP	High	25-Jun-09	COLORADO SPRINGS UTILITIES
HIGHLINE	High	19-May-09	COLORADO SPRINGS UTILITIES
LAKE MORAINE	High	16-Jul-09	COLORADO SPRINGS UTILITIES
MANITOU	High	19-Oct-09	CITY OF MANITOU SPRINGS
NORTH CATAMOUNT	High	15-Oct-09	COLORADO SPRINGS UTILITIES
PALMER LAKE #2	High	27-Jun-08	TOWN OF PALMER LAKE
PENROSE	High	25-Jun-09	COLORADO SPRINGS UTILITIES
RAMPART	High	10-Jun-09	COLORADO SPRINGS UTILITIES
REGULATING RESERVOIR	High	13-Sep-07	COLORADO SPRINGS UTILITIES
SOUTH (Quail) LAKE	High	16-Mar-10	CITY OF COLORADO SPRINGS PARKS AND RECREATION
SOUTH CATAMOUNT	High	15-Oct-09	COLORADO SPRINGS UTILITIES
SOUTH SUBURBAN	High	25-Jun-09	COLORADO SPRINGS UTILITIES
SPIRES BROADMOOR NORTH DEBRIS DAM	High	06-May-08	SPIRES BROADMOOR DRAINAGE HOA
SPIRES BROADMOOR SOUTH DEBRIS DAM	High	06-May-08	SPIRES BROADMOOR DRAINAGE HOA
SPRING RUN #2	High	12-Jul-07	MYRON STRATTON HOME
STRATTON	High	17-Sep-09	COLORADO SPRINGS UTILITIES
WOODMOOR LAKE	High	27-Jun-08	WOODMOOR WATER AND SANITATION DISTRICT NO.1
BRISTLECONE	Significant	24-Jul-07	Forest Lakes Metro District
CURR	Significant	03-Nov-06	COUNTRY CLUB OF COLORADO
KETTLE CREEK	Significant	07-Apr-98	CH2M HILL ACADEMY SERVICES, LLC
McCULLOUGH	Significant	13-Sep-07	COLORADO SPRINGS UTILITIES
MONUMENT LAKE	Significant	17-Jul-07	TOWN OF MONUMENT
NICHOLS	Significant	09-Oct-08	COLORADO SPRINGS UTILITIES
NORTHFIELD	Significant	10-Jun-09	COLORADO SPRINGS UTILITIES
PALMER LAKE #5	Significant	19-Oct-09	THE NAVIGATORS/EAGLE LAKE CAMP

Name	Hazard Classification	Inspection Date	Owner
PINON	Significant	24-Jul-07	Forest Lakes Metro District
PROSPECT LAKE	Significant	06-Nov-06	CITY OF COLORADO SPRINGS PARKS AND RECREATION
VALLEY NO. 2	Significant	06-Sep-00	CITY OF COLORADO SPRINGS PARKS AND RECREATION

Source: Colorado Division of Water Resources, Department of Natural Resources, Dam Safety Branch April 2010.

There is only one levee in the City of Colorado Springs: the Templeton Gap Floodway. The Templeton Gap Floodway starts just east of Union Boulevard and heads west to Monument Creek past Nevada Avenue. Not only does the Templeton Gap Floodway prevent flood waters from overflowing into the adjacent properties, but it also diverts flow from one drainageway to another. The Templeton Gap Floodway was constructed in 1949 by the United States Army Corps of Engineers (USACE) to divert flow away from downtown and into Monument Creek to the west. This 2-mile floodway project provides protection for approximately 5,000 structures.[7] The following figure illustrates the geographic location of the Templeton Gap Floodway.

Figure 4-3: Templeton Gap Floodway Map

Source: City of Colorado Springs website, http://www.springsgov.com/Page.aspx?NavID=2743, accessed on December 4, 2009.

[7] City of Colorado Springs website, Templeton Gap Floodway Project, http://www.springsgov.com/Page.aspx?NavID=2743, accessed on December 4, 2009.

Figure 4-4: Photos of the Templeton Gap Floodway Project

Source: City of Colorado Springs website, Templeton Gap Floodway Project, http://www.springsgov.com/Page.aspx?NavID=2743, accessed on December 4, 2009.

Previous Occurrences

There was only one documented dam failure in the City of Colorado Springs. That information was gathered from the flood hazard section of the 2005 PDM Plan. It is unclear whether or not the 'victim' described in the plan was a fatality or injury.

Date	Description	Source
1929	College Gulch flooded by 15 ft. wall of water caused by the breaking of dams on Ute Pass Fish Club – wiped out Crystola, Midland tracks, 1 victim.	2005 PDM Plan

Probability of Future Occurrence

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

There was only one known dam failure in the area. Based on previous occurrences, it appears unlikely for a dam failure to occur in Colorado Springs or vicinity. However, it should be noted that the conditions of all private dams are unknown and poor structural conditions may contribute to the likelihood of failure. All dams in Colorado fall under the regulatory authority of the Colorado Division of Water Resources Dam Safety Branch.

There are no known levee failures within the City of Colorado Springs. The Templeton Gap Levee is currently rated "minimally acceptable" by the USACE following Continuing Eligibility Inspections (CEI). With this rating, the project is still "active" and eligible to receive federally funded assistance to repair or rehabilitate it if damaged by future flood events under PL 84-99. The City has identified a preferred alternative to correct the deficiencies identified in the CEI, and to certify the levee with FEMA. The City would like to complete necessary work prior to FEMA finalizing revised floodplain maps in 2011; however, with the Stormwater Enterprise Fee phased out of future budgets, new funding must first be secured.

Magnitude/Severity

Catastrophic: *extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, and/or 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*

Should a dam with a hazard potential rating of high or significant fail upstream from the City of Colorado Springs, the results would be devastating. Dam failures typically occur with little warning. Depending on the size of the dam and the inundation area, the loss of life and amount of damage could be catastrophic.

Vulnerability Assessment

Overall Summary and Impacts: The State of Colorado requires Emergency Action Plans (EAPs) for all High and Significant Hazard dams due to the increased potential for loss of life and/or property damage in the event of a dam failure. This Plan helps to manage and mitigate the risks posed by Colorado Springs Significant and High Hazard dams.

The EAP is a formal document that outlines possible emergency conditions at a dam, sets forth actions to minimize damages and danger, and includes a plan for the dam owner to moderate or alleviate the problems at the dam. 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.

Identifying Structures and Estimating Potential Losses: Inundation maps are required for each dam with an EAP. An inundation map illustrates which properties may be affected by floodwaters and show 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 of the EAPs remain on file with the Colorado Springs Office of Emergency Management and the El Paso County Office of Emergency Management.

Future Development: Existing floodplain regulations are designed to decrease future losses from events such as dam or levee failure. However, upstream locations with lacking or unenforced floodplain regulations, may lead to structures being built in the floodplain. This situation may create more potential debris flow during major flood events or dam failures and could damage or destroy downstream dams. Any additional development downstream of a dam and within the inundation area could elevate the dam hazard ranking and the level of risk.

Data Limitations

Due to national security measures, access to dams data is fairly limited. Inundation areas associated with a failure are not included in this Plan. Also, the existing conditions of private dams are not readily available.

4.4 Drought

Hazard Description

Drought is a shortage of water associated with a deficiency of precipitation, 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.
- **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 for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

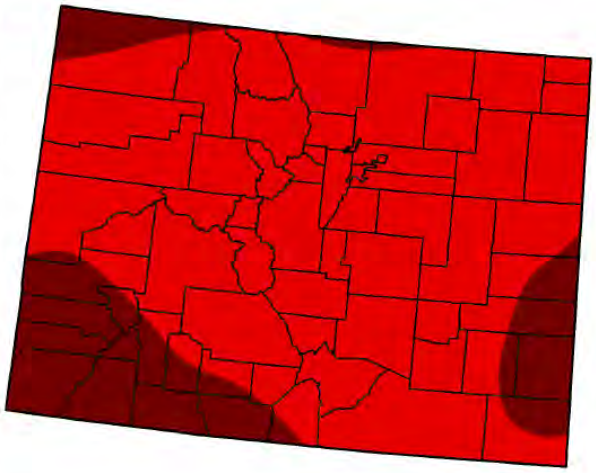
Geographic Location

Drought is a regional phenomenon and affects all areas of Colorado Springs with similar frequency and severity. The U.S. Drought Monitor provides online maps of the current drought status nationwide, updated weekly. Following are examples of Colorado drought conditions; one from August 2002 (Figure 4-5) and the other from August 2009 (Figure 4-6). In 2002, Colorado saw one of the driest years on record, whereas 2009 was somewhat of a wet year for the region.

Figure 4-5: Colorado Drought Conditions August 27, 2002 – Extreme Drought

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.0	100.0	100.0	100.0	100.0	20.2
Last Week (08/20/2002 map)	0.0	100.0	100.0	100.0	100.0	19.8
3 Months Ago (06/04/2002 map)	0.0	100.0	100.0	100.0	70.4	9.0
Start of Calendar Year (01/01/2002 map)	44.2	55.8	14.7	0.0	0.0	0.0
Start of Water Year (10/02/2001 map)	62.7	37.3	0.0	0.0	0.0	0.0
One Year Ago (08/28/2001 map)	93.7	6.3	0.0	0.0	0.0	0.0



Intensity:

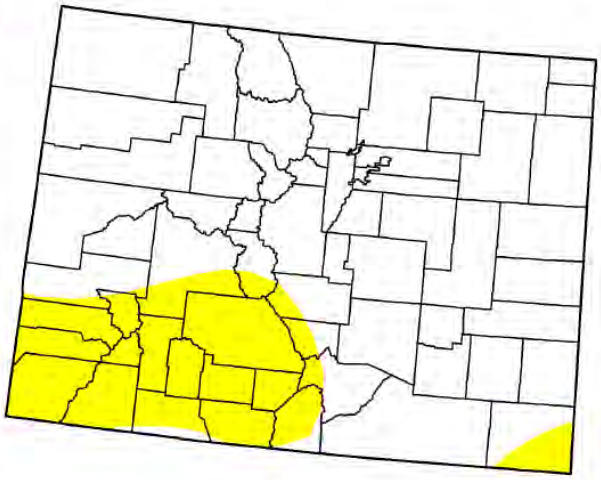
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Source: National Drought Mitigation Center's Drought Monitor, http://www.drought.unl.edu/dm/index.html, accessed November 19, 2009.

Figure 4-6: Colorado Drought Conditions August 25, 2009 – No Drought Conditions

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	79.9	20.1	0.0	0.0	0.0	0.0
Last Week (08/18/2009 map)	93.1	6.9	0.0	0.0	0.0	0.0
3 Months Ago (06/02/2009 map)	86.1	13.9	0.0	0.0	0.0	0.0
Start of Calendar Year (01/06/2009 map)	26.6	73.4	5.9	0.0	0.0	0.0
Start of Water Year (10/07/2008 map)	43.0	57.0	12.7	3.4	0.0	0.0
One Year Ago (08/26/2008 map)	42.1	57.9	17.9	3.7	0.0	0.0



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Source: National Drought Mitigation Center's Drought Monitor, http://www.drought.unl.edu/dm/index.html, accessed November 19, 2009.

Previous Occurrences

There have been several documented periods of drought throughout Colorado history. The following table outlines known periods of drought in El Paso County.

Table 4-6: Known Drought periods in Colorado Springs (El Paso County, Colorado)

Years	Description of Event	Data Source
1931-1941	Widespread, severe, and long lasting drought in Colorado.	State Drought Plan
1950-1956	Statewide, worse than the 1930s in the Front Range. $40 million in Federal aid made available for 13 drought stricken states and used to defer cost of transporting hay.	NDMC
1989	Estimated crop damages nearly $1,000,000.	SHELDUS
2000-2003	Significant multi-year statewide drought, with many areas experiencing most severe conditions in Colorado in instrumented history. 2002 was the driest year on record for the Denver region and much of the state. For the first time in state history, the Colorado governor asked the Federal government to declare all of Colorado a drought disaster area. Estimated 1.1 billion in losses to Colorado's agricultural, tourism, and recreational industries.	CWCB
2005	El Paso County designated as natural disaster area.	USDA-FSA
2006	El Paso County designated as natural disaster area.	USDA-FSA
2008	El Paso County designated as natural disaster area as a continuous drought occurred throughout the year.	USDA-FSA

Sources: Colorado Water Conservation Board (CWCB) Drought and Water Supply Assessment, 2004, http://cwcb.state.co.us/Conservation/Drought/Drought_Water/index_DWSA.html; National Drought Mitigation Center (NDMC) Drought Impact Reporter, http://droughtreporter.unl.edu/., US Department of Agriculture Farm Services Agency, http://www.fsa.usda.gov/FSA, accessed on December 2, 2009.

Statewide, Colorado has experienced multiple wet and dry cycles. The *Colorado Drought Mitigation and Response Plan (2001)* identified the multi-year dry periods in Colorado, as listed in Table 4-7, below.

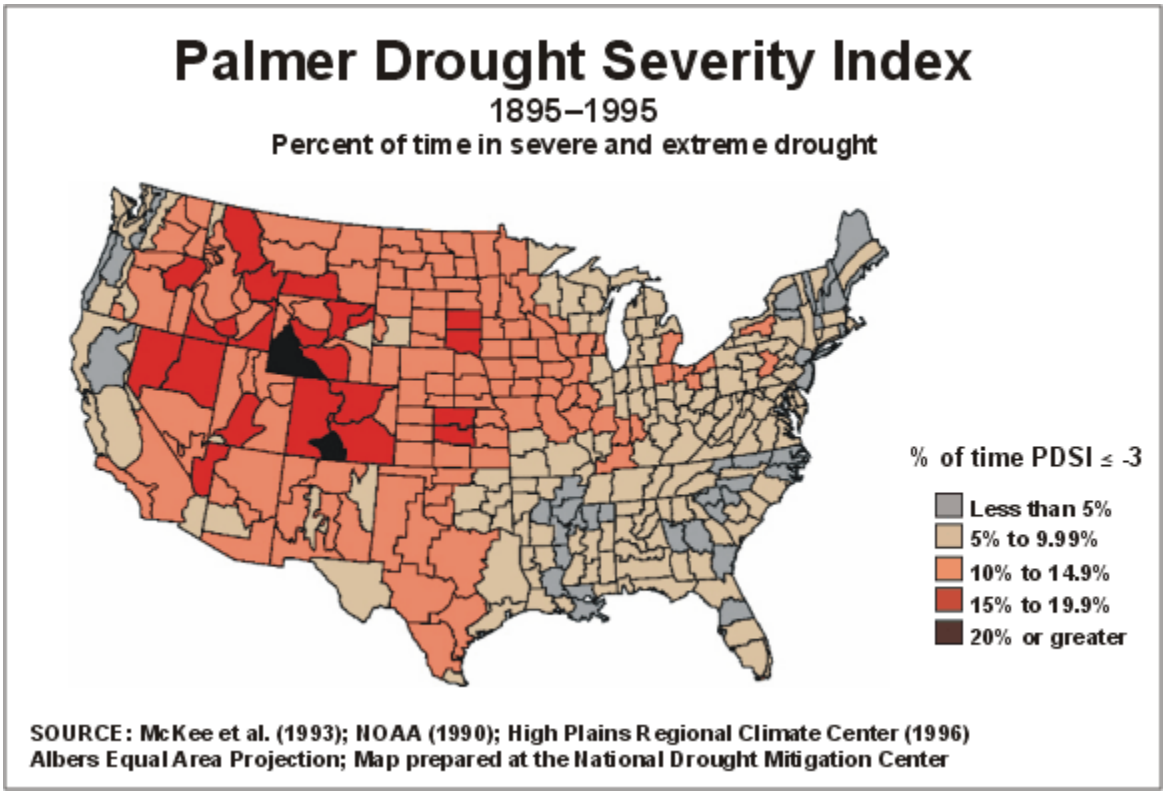
Table 4-7: Colorado Historical Dry Periods

Years	Duration of Event (years)
1893-1905	12
1931-1941	10
1951-1957	6
1963-1965	2
1975-1978	3

Source: Colorado Drought Mitigation and Response Plan 2001, http://www.dola.state.co.us/dem/mitigation/plan_2007/Drought%20Plan.pdf, Accessed on December 2, 2009.

Figure 4-7 shows that Colorado Springs is located in an area of Colorado that has experienced drought 15 to 20 percent of the time over the 100-year period from 1895-1995.

Figure 4-7: United States Percent of Time in Drought, 1895–1995



Source: National Drought Mitigation Center, http://drought.unl.edu/whatis/palmer/pdi1895.gif, accessed on November 10, 2009.

In 2005 Colorado Springs had a mandatory watering restriction in effect from April 15th to October 15th. This restriction prohibited watering between 9:00 a.m. and 6:00 p.m. and designated specific watering days for customers. Voluntary watering restrictions went into effect from October 2005 continuing through 2009.[8] These restrictions indicate a response to dry periods where scarcity of water called for immediate action.

Probability of Future Occurrence

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

When known previous occurrences are examined, there were seven known periods of drought affecting El Paso County since 1931, a 78-year period. Based on this we can estimate a probability of nine percent that a drought will occur in a given year, or that a drought will occur once every 11 years. Using historical dry periods, Colorado experiences a dry period every 15 to 20 years.

[8] Email from Tama Wagoner, Colorado Springs Utilities, January 12, 2010.

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*

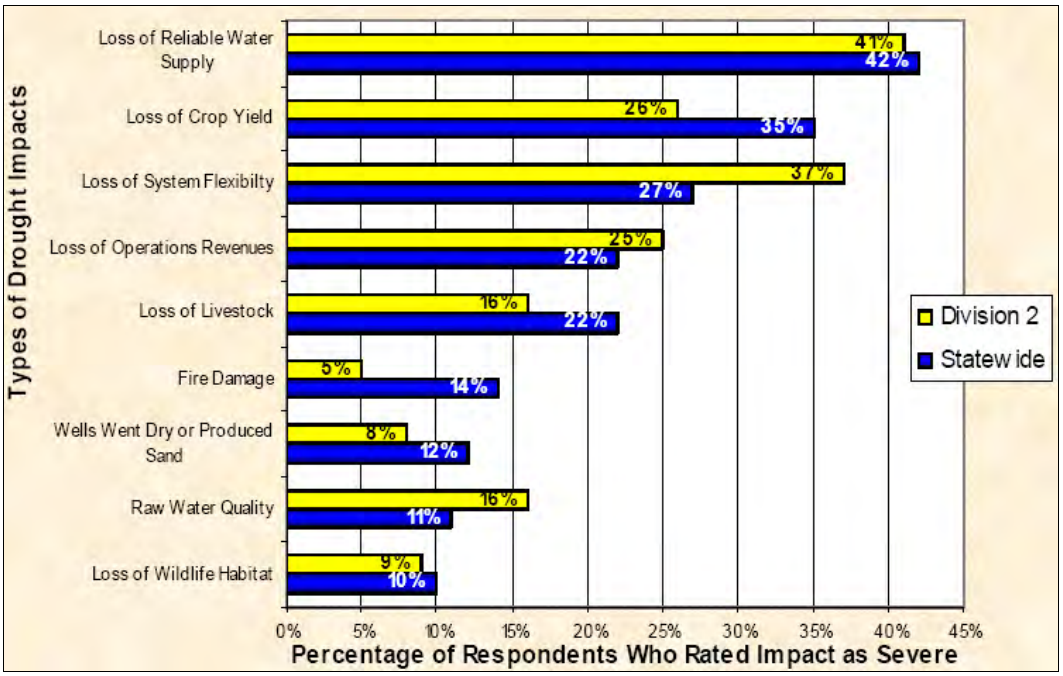
Although no injuries or property damages are typically associated with drought, the loss of farmland and diminishing domestic water supply can be devastating to the local economies. Although Colorado Springs has fewer farms than eastern El Paso County, the city would still feel the economic and social impacts associated with drought.

Vulnerability Assessment

Overall Summary and Impacts: The most significant impacts from drought are related to water-intensive activities, such as municipal usage, agriculture (both crops and livestock), wildfire protection, commerce, recreation, and wildlife preservation (through maintained wetlands), as well as a reduction of electric power generation and water quality deterioration. Secondary impacts of drought are wildfires, wind erosion, and soil compaction that can make an area more susceptible to flooding.

In the 2004 Drought and Water Supply Assessment for the Arkansas Basin (Division 2), completed by the CWCB, water users including Colorado Springs, rated the severity of impacts from the recent 1999-2003 drought. Figure 4-8, below, illustrates the perceived impacts to drought throughout the Arkansas River Basin (Division 2). The results show that water users are most concerned with the loss of a reliable water supply and loss of system flexibility. The Arkansas River Basin users were also significantly more concerned with raw water quality than statewide users as a whole.

Figure 4-8: Perceived Drought Impacts in the Arkansas River Basin (Division 2), 1999-2003



Source: Colorado Drought and Water Supply Assessment, 2004: http://cwcb.state.co.us/NR/rdonlyres/7D82E161-1DA2-4D02-81A6-0BB1F3E36557/0/Arkansas_DWSA.pdf, accessed on 11/19/09.

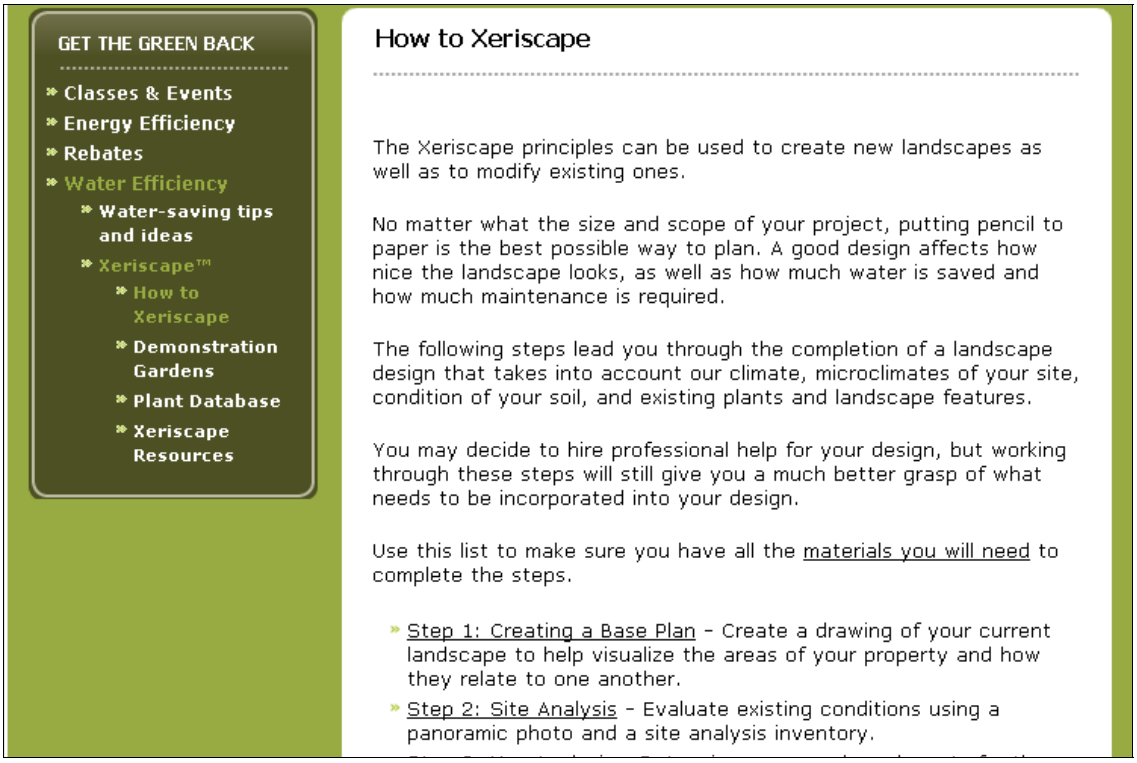
The National Drought Mitigation Center (NDMC) identifies impacts of drought by county through their Drought Impact Reporter. This is a collection of disaster declarations, online newspaper articles and scientific publications, and other information pertaining to drought that identifies a particular impact to drought including environmental, social, agricultural, water use/energy, fire, and others. This database includes 120 drought impacts specific to El Paso County since 1950. The most prominent impact listed 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.

Identifying Structures and Estimating Potential Losses: Drought normally does not impact structures. Although water and sewer infrastructure may be affected by drought, other critical facilities are generally not. Data is not available to estimate potential losses to structures in identified hazard areas. The greatest risk to people from drought is the loss of drinking water supply through water systems or individual wells. Colorado Springs Utilities completed their Water Conservation Plan for 2008-2012. In that plan, they indicate that according to future demand expectations, they have adequate water supply to meet the projected needs to 2046. However, raw water delivery systems could reach capacity as early as 2012. The efforts for conservation are heavily focused on maintaining a low residential per capita water use for Colorado Springs.[9]

Future Development: One of the most significant impacts of drought is the decreased supply of water for the city's inhabitants. As growth continues, so does the vulnerability for residents and business owners to drought impacts. Careful monitoring of the city's water supply will help drive conservation efforts and potential land use regulations aimed at minimizing drought impacts amongst other growth-related impacts. Colorado Springs Utilities has developed numerous programs aimed at conservation of water. The Xeriscape Education program on the Colorado Springs Utilities website is one example of public outreach regarding water conservation efforts. Figure 4-9 is a screen-capture of the online Xeriscape Education program through Colorado Springs Utilities.

[9] Colorado Springs Utilities Water Conservation Plan 2008-2012, submitted to the CWCB December 31, 2007, p. 7.

Figure 4-9: Xeriscape Education from the Colorado Springs Utilities Website



Source: Colorado Springs Utilities website, http://www.csu.org/residential/greenback/water/xeriscape/how-to/item1125.html, accessed on January 18, 2010.

Data Limitations

Most data on drought is available for the state, county, or the Arkansas Basin, and not city-specific. In addition, total event-specific losses are difficult to assess due to the inability to determine the exact beginning and ending of a drought period.

4.5 Earthquake

Hazard Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. 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 4-8: 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 similar to 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.

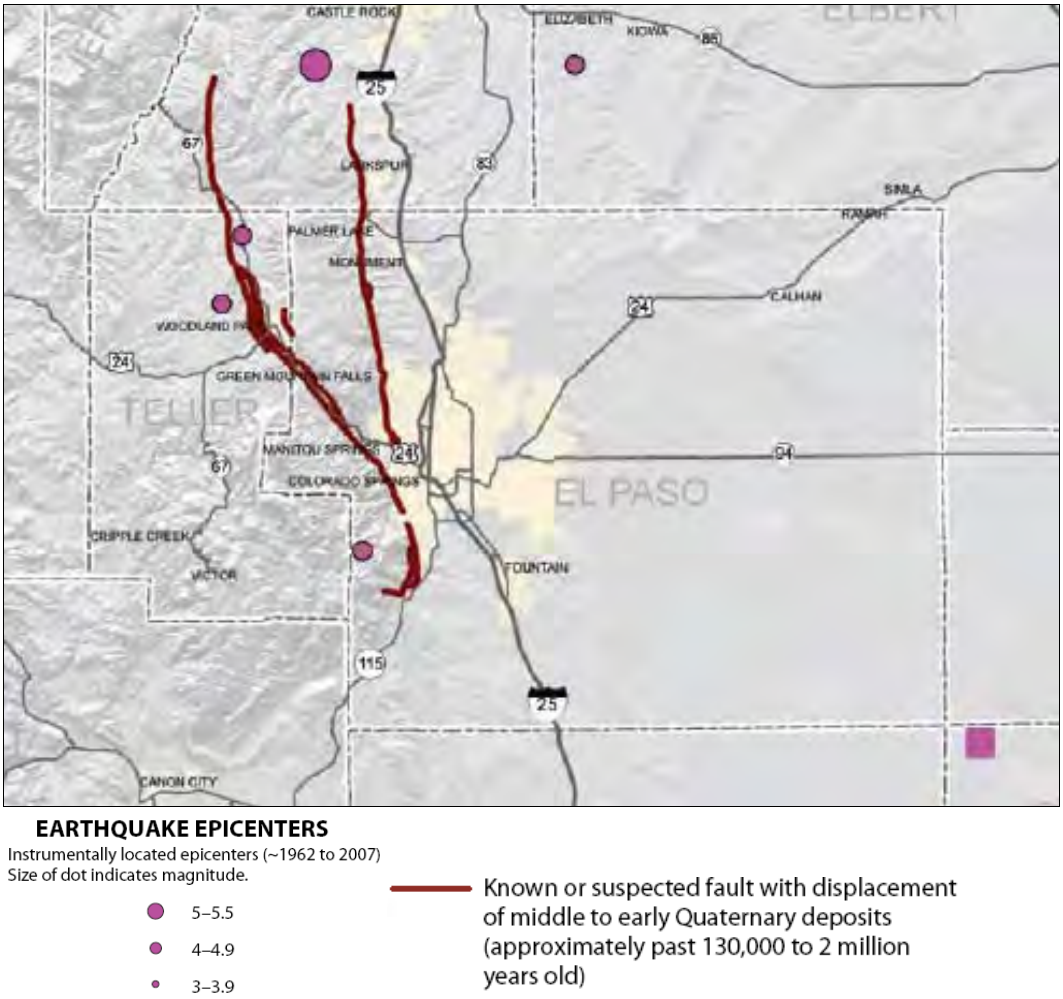
According to the Colorado Geological Survey, Colorado is comprised of areas with low to moderate potential for damaging earthquakes. There are about 90 potentially active faults that have been identified in Colorado, with documented movement within the last 1.6 million years. However, there are several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

Geographic Location

Earthquakes are a regional hazard that would affect all areas of Colorado Springs with similar magnitude and severity. Figure 4-10, taken from the Colorado Earthquake Hazards Brochure,[10] illustrates both the presence of quaternary faults in the Colorado Springs area and the epicenters of historical events. The Ute Pass Fault Zone runs approximately along State Highways 67 and 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.

[10] Colorado Earthquake Hazards Brochure, Colorado Earthquake Hazards Mitigation Council, 2008.

Figure 4-10: Colorado Earthquake History and Fault Map, Colorado Springs Vicinity



Source: Colorado Geological Survey Earthquake History Map, http://geosurvey.state.co.us/Portals/0/Earthquake_Map_2008.pdf, accessed on December 2, 2009.

Previous Occurrences

There were six documented earthquakes in the State Earthquake Evaluation Report affecting El Paso County as listed in the following table. Although the epicenters were relatively close to the City of Colorado Springs, these earthquakes did not impact the City of Colorado Springs in terms of damages. Most earthquakes that have occurred in this region have not been felt by humans.

Table 4-9: Known Historical Earthquakes, El Paso County, Colorado

Date	Location
12/23/1995	Manitou Springs
12/31/1995	Manitou Springs
01/1997	Woodland Park
4/18/1998	Woodland Park
7/22/2001	Woodland Park
2/19/2003	Woodland Park

Source: Colorado Earthquake Evaluation Report, http://www.dola.colorado.gov/dem/mitigation/earthquakerpt.pdf.

Probability of Future Occurrence

For the purpose of this Plan, the Planning Subcommittee decided to break out earthquakes into two distinct categories: The typical earthquake documented in the area, low on the Mercalli scale and rarely even felt by people in Colorado Springs; and a significant earthquake (6.0 or 7.0 on the Richter scale) modeled using HAZUS software that would be strong enough to produce damages to the City of Colorado Springs should it occur. The probability of the two categories is as follows:

Typical Earthquake

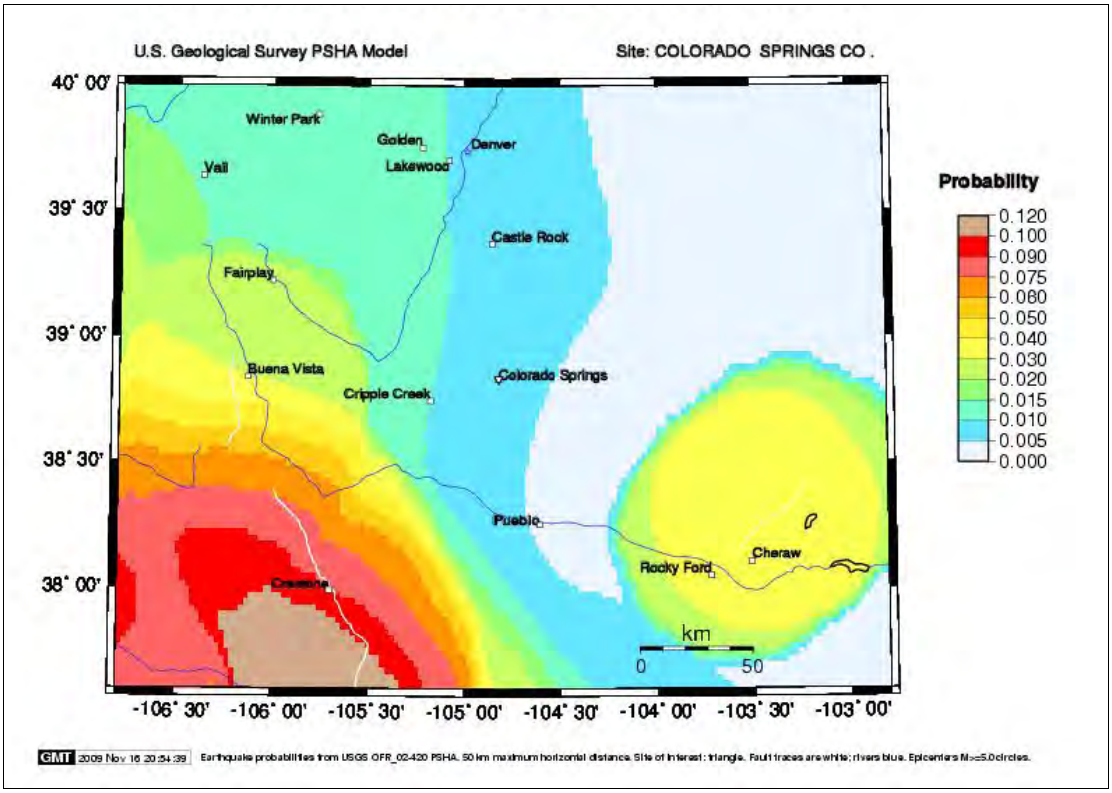
Occasional: *1-10 percent chance of occurrence in the next year or it has a recurrence interval of 11 to 100 years*

Significant Earthquake (6.0 or 7.0)

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

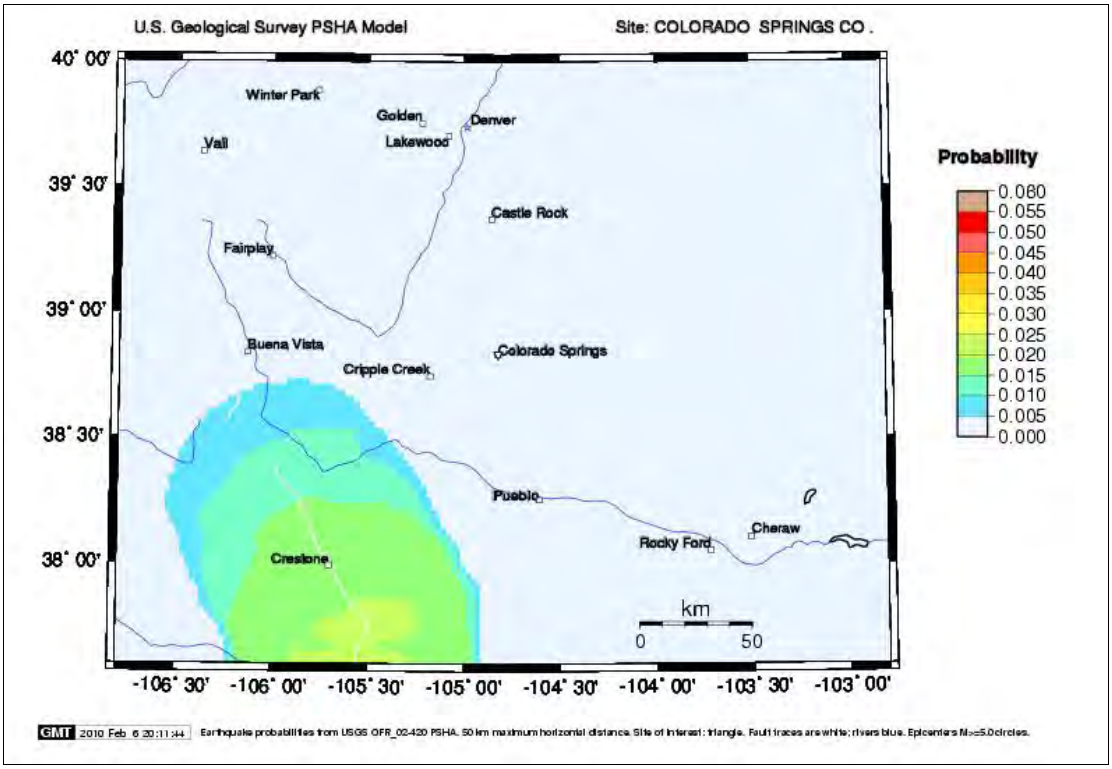
The occurrence of earthquakes is relatively infrequent in Colorado, and the historical earthquake record is short (only about 150 years). Basing probability on documented quakes from the Colorado Earthquake Evaluation Report may not provide the City of Colorado Springs with an accurate understanding of risk. There were six earthquakes in the vicinity from 1995 to 2003, equating to a 75% chance of an earthquake occurring any given year, or once every 1.3 years. However, the earthquake hazard is thought to be not well understood and the potential for unknown active faults exists. Although the probability of an earthquake occurring in Colorado Springs is "occasional" based on previous occurrences, the purpose of this study is to determine potential losses from an earthquake large enough to produce damages and potential injury. The Colorado Earthquake Evaluation Report identifies El Paso County as being at the greatest risk of all counties regarding total economic losses and casualties, based on the HAZUS analysis for that report. The USGS offers an online mapping system for earthquake probability as part of the USGS National Seismic Hazard Mapping Project. Figure 4-11 and Figure 4-12, below, illustrate the probability of a 6.0 and 7.0 or greater magnitude earthquake occurring near Colorado Springs within the next 150 years. The results show that there is only a 0.5 to 1% chance of a 6.0 event, and up to a 0.5% chance of a 7.0 event occurring within 150 years. In other words, the probability of a significant earthquake occurring in Colorado Springs is "unlikely."

Figure 4-11: Probability of Earthquake of 6.0 or Greater occurring within 150 years



Source: USGS Earthquake Hazards Program, http://eqint.cr.usgs.gov/eqprob/2002/index.php, November 16, 2009.

Figure 4-12: Probability of Earthquake of 7.0 or Greater occurring within 150 years



Source: USGS Earthquake Hazards Program, http://eqint.cr.usgs.gov/eqprob/2002/index.php, November 16, 2009.

Magnitude/Severity

As with probability, the Planning Subcommittee decided to break out earthquakes into two distinct categories for magnitude: The typical earthquake documented in the area, low on the Mercalli scale and rarely even felt by people in Colorado Springs; and a significant earthquake (6.0 or 7.0 on the Richter scale) modeled using HAZUS software that would be strong enough to produce damages to the City of Colorado Springs should it occur. The magnitude of the two categories is as follows:

Typical Earthquake

Negligible: *No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services*

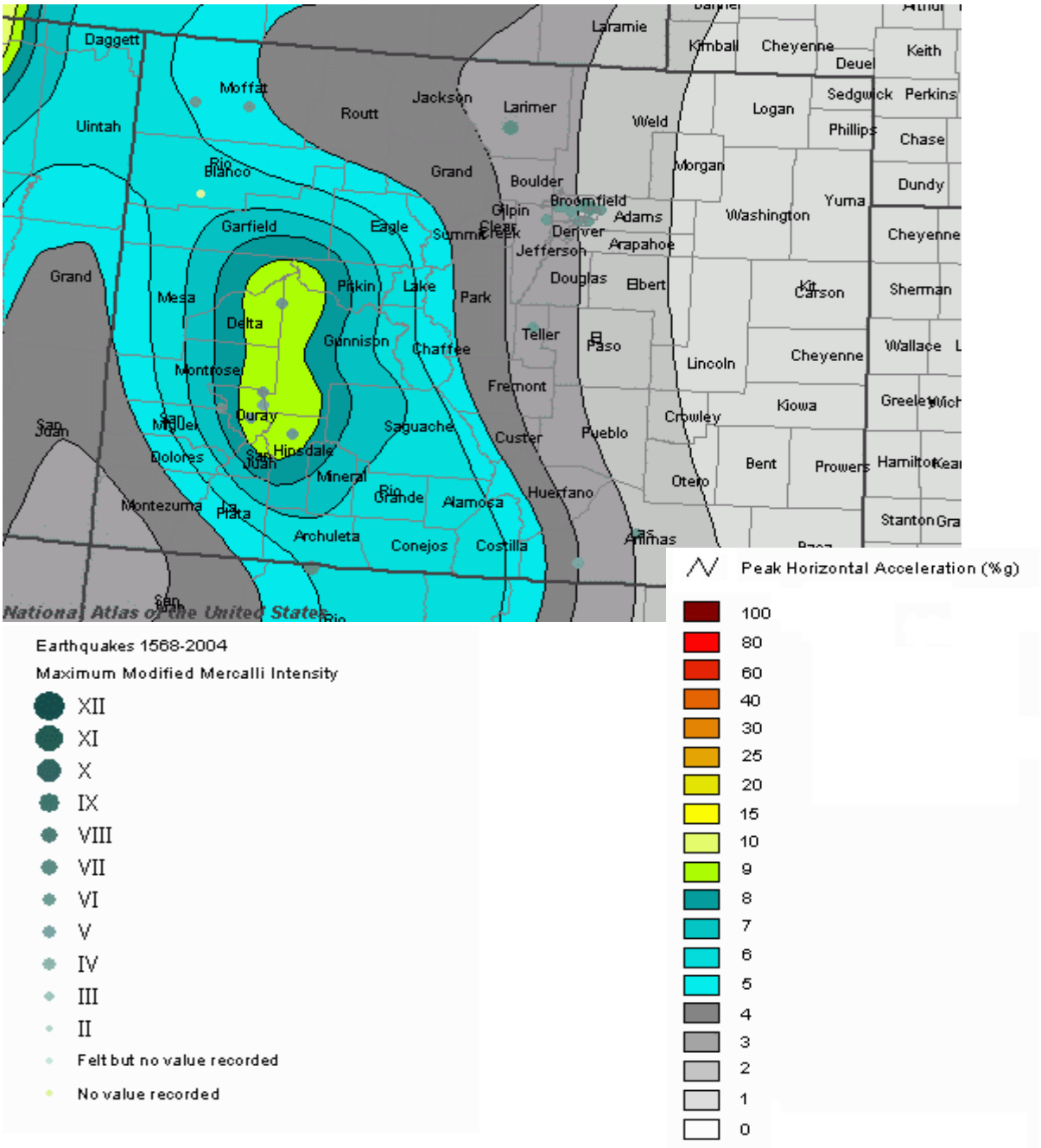
Significant Earthquake (6.0 or 7.0)

Catastrophic: *extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, and/or 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*

As shown in the following figure, in Colorado Springs (western El Paso County), the shaking level with a 10 percent chance of being exceeded over a period of 50 years is in the range of 2 to 3 percent peak acceleration. Significant earthquake damage typically does not occur until peak accelerations are greater than 30 percent. Secondary impacts of earthquakes may include landslides, seiches, liquefaction, fires, and dam failure. The HAZUS modeling for this plan update show that a 6.0 or 7.0 quake

would cause a range of peak ground acceleration, from strong perceived shaking on the eastern side of the city, to severe perceived shaking on the western side. The HAZUS results are detailed in the next section of the earthquake profile – vulnerability assessment.

Figure 4-13: Seismic Hazard, 10% Probability to Exceed in 50 Years



Source: U.S. Geological Survey/www.nationalatlas.gov, accessed on November 10, 2009.

Vulnerability Assessment

Overall Summary and Impacts: Due to the proximity of the City of Colorado Springs to several faults and folds, the possibility of a large earthquake is not entirely out of the question. Again, the documented earthquake history is relatively short in geologic time. Depending on the location of the epicenter, and the magnitude of the quake, ground shaking perception may differ from one area of the city to another. For the modeled scenarios in this report, the most intense ground shaking and damages would be in the western half of the city, including the downtown area where thousands of people would either be at work, or traveling to or from work. The significant ground shaking could damage structures, roads, critical infrastructure, and cause bodily harm or death.

Identifying Structures and Estimating Potential Losses: All structures in Colorado Springs are potentially vulnerable to seismic ground shaking. The most vulnerable are historic buildings constructed of unreinforced masonry. Some historic buildings in Colorado Springs may be more susceptible to damages in a seismic event, due to the time period in which they were constructed.

The Colorado Geological Survey (CGS) ran a series of deterministic scenarios for selected Colorado faults, by county, using HAZUS-MH to assess potential economic and social losses due to earthquake activity in Colorado. The earthquake magnitudes used for each fault were the "maximum credible earthquake" as determined by the U.S. Geological Survey. There are three faults within El Paso County; Colorado Springs Faults, Rampart Range, and Ute Pass. There were seven faults analyzed in the State Earthquake Evaluation Report to determine potential damages in El Paso County. They are the Chase Gulch, Cheraw, Goodpasture, Rampart, N. Sangre de Cristo, S. Sawatch, and Ute Pass.

Table 4-10: Fault Analysis from the State Earthquake Evaluation Report

Fault	Magnitude	Fatalities	Total Economic Loss ($Millions)
Chase Gulch	6.75	3	$494.6
Cheraw	7.00	2	$317.6
	5.50	0	$5.5
Goodpasture	6.00	0	$11.6
Rampart	7.00	114	$3,460.0
	6.50	75	$3,000.0
	6.00	22	$1,770.0
	5.50	3	$753.0
N. Sangre de Cristo	7.50	0	$79.6
	6.50	0	$9.5
	5.50	0	$0.01
S. Sawatch	7.25	0	$29.7
Ute Pass	7.00	577	$7,920.0
	6.50	144	$3,300.0
	6.00	16	$988.0
	5.50	2	$282.6

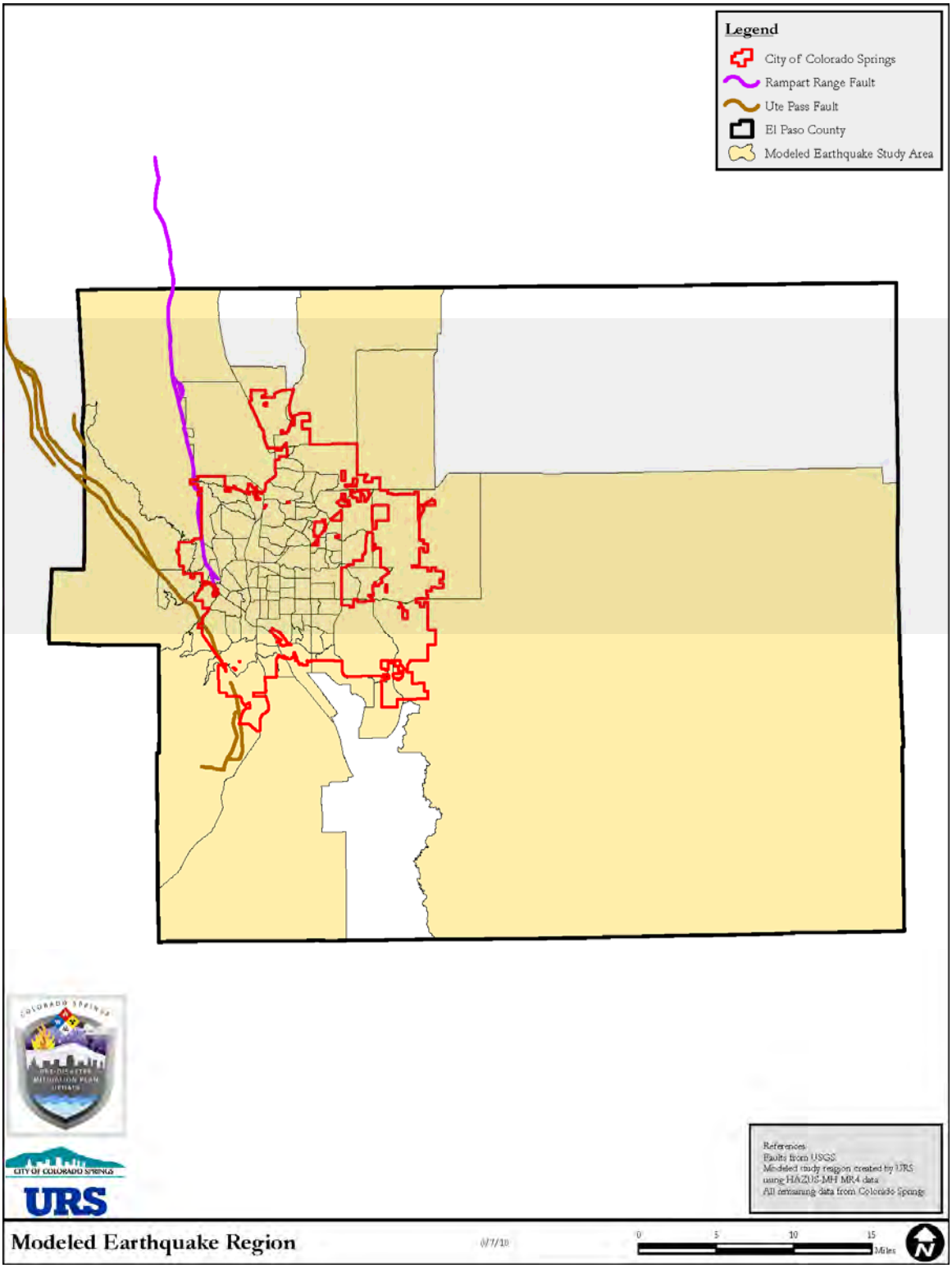
Source: Earthquake Evaluation Report, www.dola.colorado.gov/dem/mitigation/earthquakerpt.pdf

According to the CGS analysis, the greatest losses to El Paso County would likely result from a 7.0 or greater magnitude earthquake on the Ute Pass fault. This event would result in estimated total economic losses of $7.92 billion and 577 fatalities.

2010 PDMP Update

For this study, HAZUS-MH MR4 was run on both the Rampart and Ute Pass faults, for the 6.0 event and 7.0 events. These faults were chosen based on their close proximity to the City limits. Because the model was set up based on census tract data, the defined region studied is larger than that of the City of Colorado Springs. Therefore, the damage estimates may be skewed. This region is comprised of 165,000 buildings, with an aggregate replacement value of $33,207,000,000. The population in this defined region, based on 2000 Census, is 460,619 people. Figure 4-14 shows the modeled earthquake HAZUS region used for this 2010 Update. The HAZUS modeling methodology is included in Appendix G: References.

Figure 4-14: Modeled Earthquake Region



Source: Created by URS, intended for planning purposes only, 2010.

The models were run using the Western Attenuation Function for a shallow crustal event. The epicenter was located near the southern end for each fault, nearest to downtown. The tables below summarize the expected damages for each event scenario. The most damaging event based on the HAZUS modeling would be the 7.0 Magnitude on the Ute Pass Fault, causing over $10 billion in building-related damages and 563 fatalities.

Table 4-11: Expected Building (count) Damage by Occupancy – Rampart Fault 6.0

Occupancy	Slight	Moderate	Extensive	Complete
Agriculture	82	77	36	8
Commercial	1,754	1,964	906	196
Education	53	57	26	5
Government	69	75	28	4
Industrial	488	586	290	65
Other Residential	5,478	4,143	1,440	254
Religion	134	140	63	12
Single-Family	22,671	11,609	3,659	500
TOTAL	**30,729**	**18,651**	**6,448**	**1,045**

Table 4-12: Expected Building (count) Damage by Occupancy – Rampart Fault 7.0

Occupancy	Slight	Moderate	Extensive	Complete
Agriculture	86	109	96	81
Commercial	1,029	2,528	2,605	2,084
Education	42	74	79	62
Government	37	101	115	77
Industrial	285	708	763	658
Other Residential	5,881	6,482	4,668	3,180
Religion	108	181	189	143
Single-Family	33,075	27,477	13,461	6,218
TOTAL	**40,543**	**37,660**	**21,976**	**12,503**

Table 4-13: Expected Building (count) Damage by Occupancy – Ute Pass Fault 6.0

Occupancy	Slight	Moderate	Extensive	Complete
Agriculture	85	83	41	11
Commercial	1,759	2,109	1,058	267
Education	55	62	30	7
Government	73	97	45	9
Industrial	496	627	326	80
Other Residential	5,916	4,922	1,890	373
Religion	137	153	76	17
Single-Family	24,771	13,927	4,619	728
TOTAL	**33,292**	**21,980**	**8,085**	**1,492**

Table 4-14: Expected Building (count) Damage by Occupancy – Ute Pass Fault 7.0

Occupancy	Slight	Moderate	Extensive	Complete
Agriculture	86	114	99	79
Commercial	1,047	2,545	2,600	2,063
Education	42	76	80	60
Government	30	93	121	96
Industrial	291	720	770	642
Other Residential	5,709	6,909	5,078	3,414
Religion	107	185	191	144
Single-Family	32,675	29,268	14,700	6,552
TOTAL	**39,987**	**39,910**	**23,639**	**13,050**

Table 4-15: Expected Building-Related Economic Losses*

Event	Losses
Rampart 6.0	$2,369,570,000
Rampart 7.0	$10,130,160,000
Ute Pass 6.0	$2,922,220,000
Ute Pass 7.0	$10,537,570,000

* includes income losses and structural and non-structural losses such as contents.

Table 4-16: Expected Casualties at 2:00 p.m.

Event	Injuries	Fatalities
Rampart 6.0	1,077	55
Rampart 7.0	7,703	574
Ute Pass 6.0	1,293	68
Ute Pass 7.0	7,618	563

Table 4-17: Expected Damages to Transportation and Utility Lifelines

Event	Losses
Rampart 6.0	$106,670,000
Rampart 7.0	$358,140,000
Ute Pass 6.0	$153,170,000
Ute Pass 7.0	$395,390,000

The following maps (Figure 4-15 through Figure 4-18) show the results of the peak ground acceleration analysis modeled by HAZUS for this PDMP Update. The maps indicate the perceived shaking and potential damages for each earthquake scenario (6.0 and 7.0) on both the Rampart Fault and the Ute Pass Fault.

Figure 4-15: Modeled Peak Ground Acceleration, Rampart 6.0 Magnitude

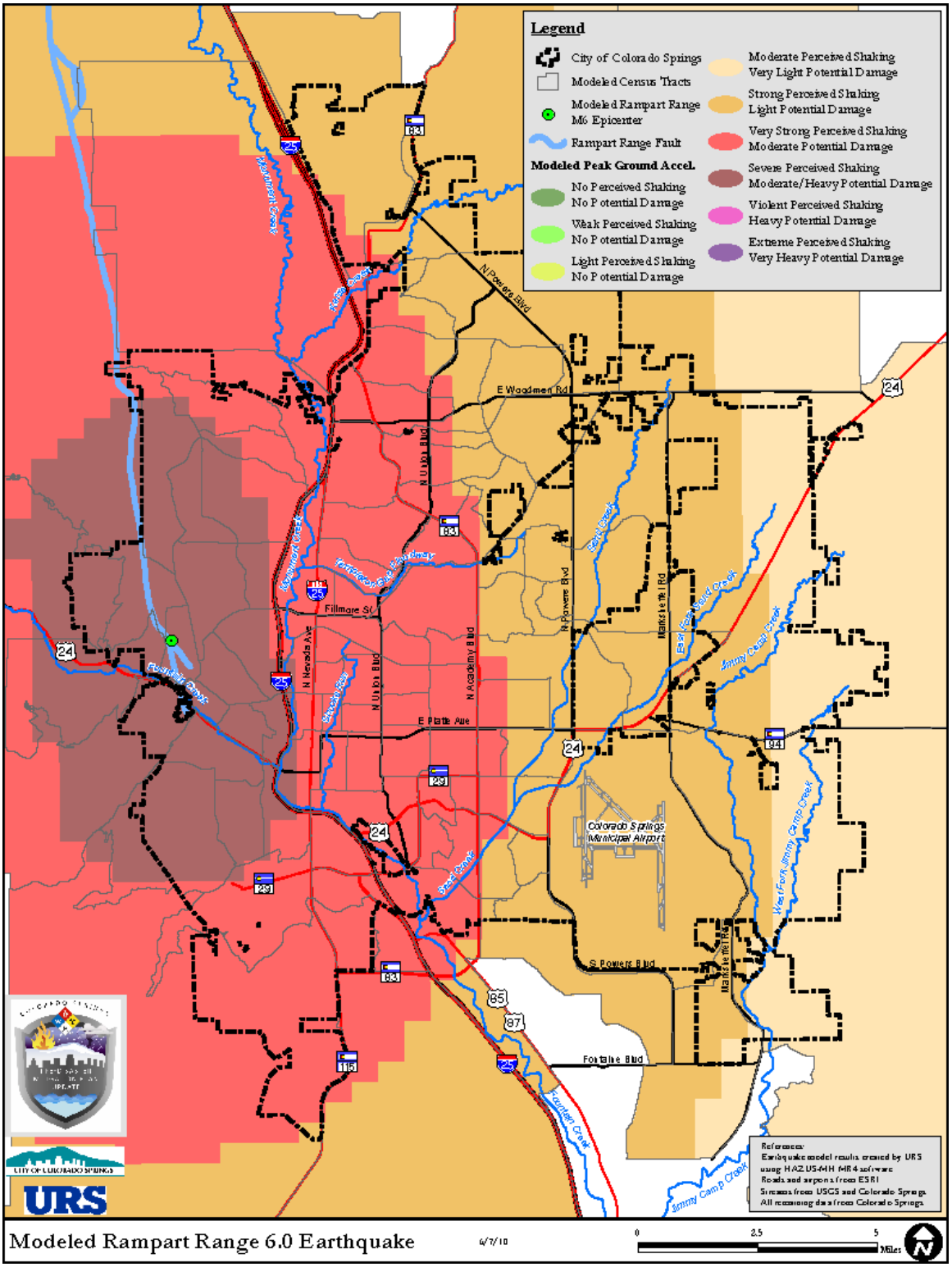


Figure 4-16: Modeled Peak Ground Acceleration, Rampart 7.0 Magnitude

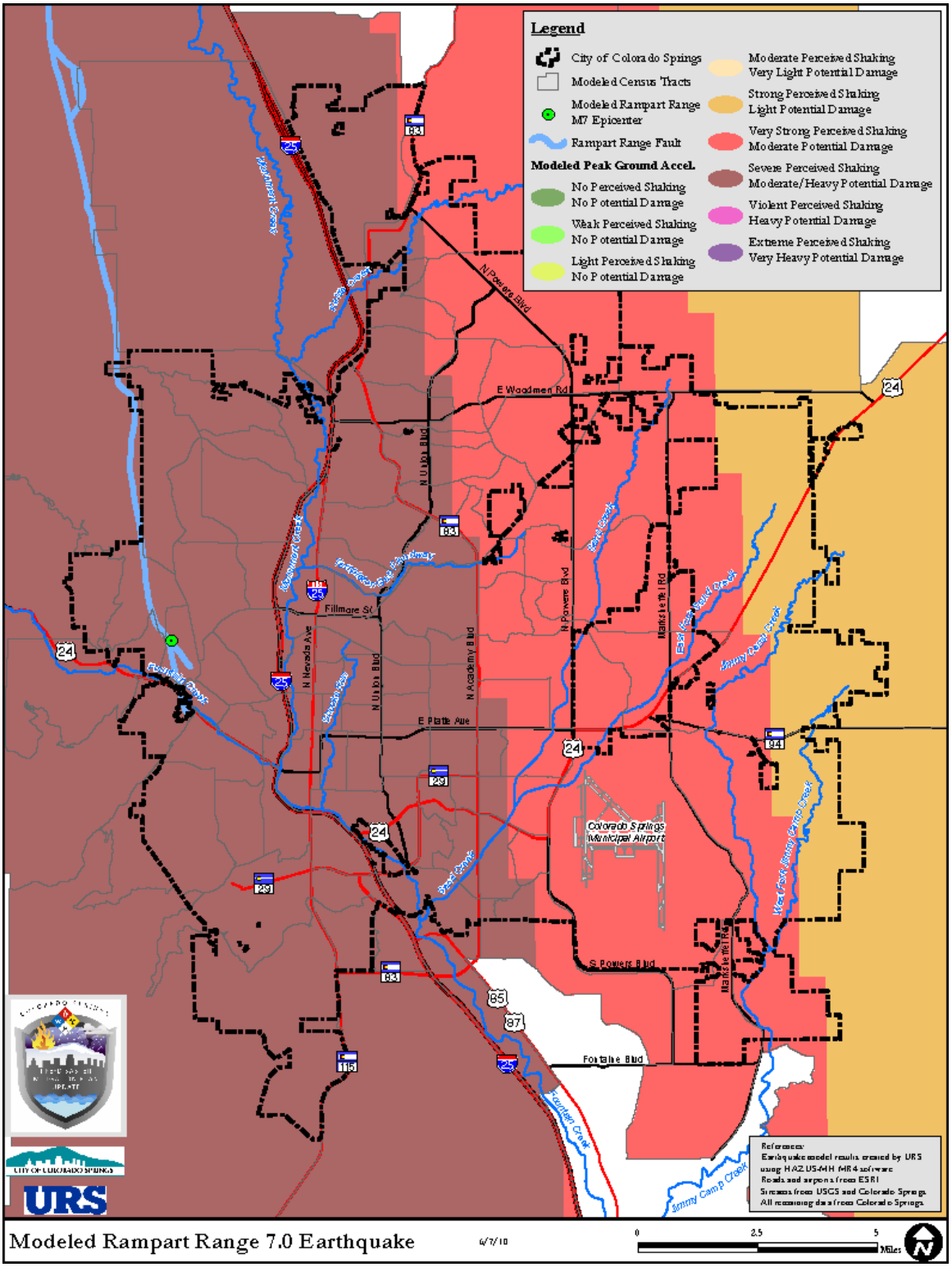


Figure 4-17: Modeled Peak Ground Acceleration, Ute Pass 6.0 Magnitude

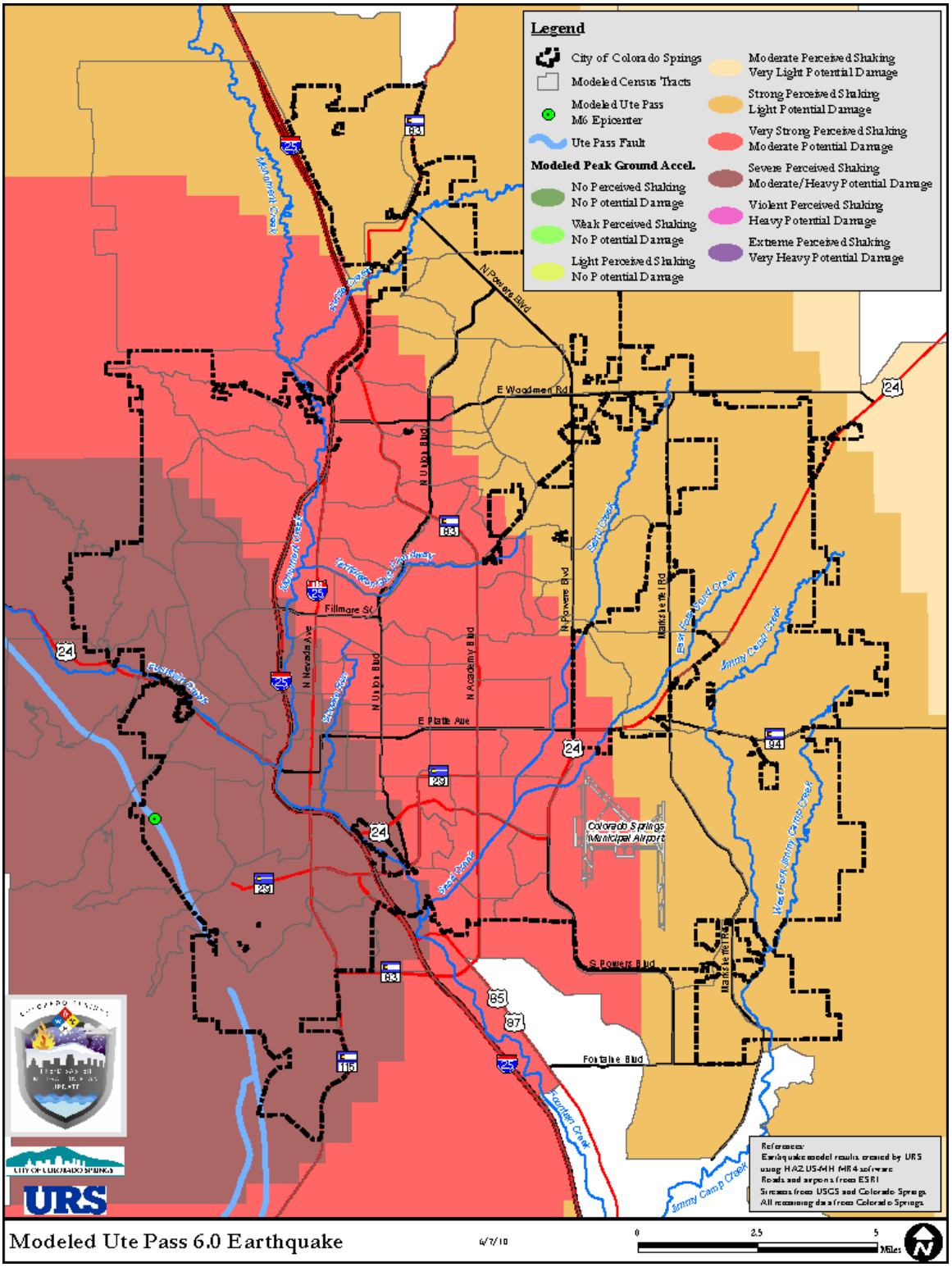
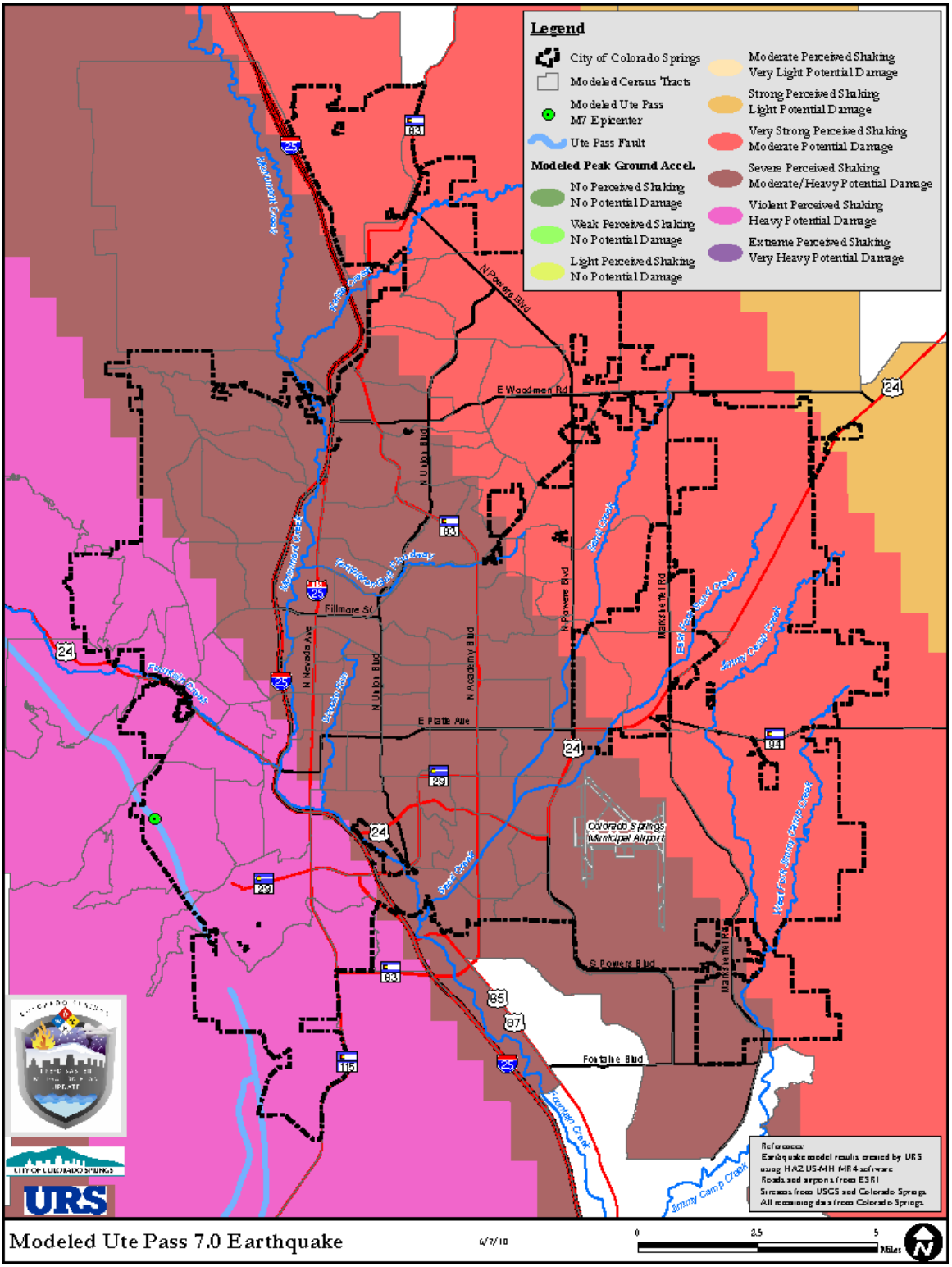


Figure 4-18: Modeled Peak Ground Acceleration, Ute Pass 7.0 Magnitude



Future Development: Because the City of Colorado Springs has adopted building codes, the potential cost of damages to future structures from earthquakes is substantially reduced, compared to buildings that are not constructed to a code designed to withstand ground shaking.

Data Limitations

Estimating the timing or location of future dangerous earthquakes in Colorado with accuracy is not possible. The geologic historical records are quite short (about 150 years), and the lack of an adequate network of seismometers in Colorado makes earthquakes difficult to detect and locate.

4.6 Flood

Hazard Description

Colorado Springs is at risk to riverine and stormwater flooding. Riverine flooding is defined as when a watercourse exceeds its "bank-full" capacity and generally occurs as a result of prolonged rainfall, or rainfall that is combined with soils already saturated from previous rain events. The area adjacent to a river channel is its floodplain. In its common usage, "floodplain" most often refers to that area that is inundated by the 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The one percent annual flood (or base flood) is the national standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP).

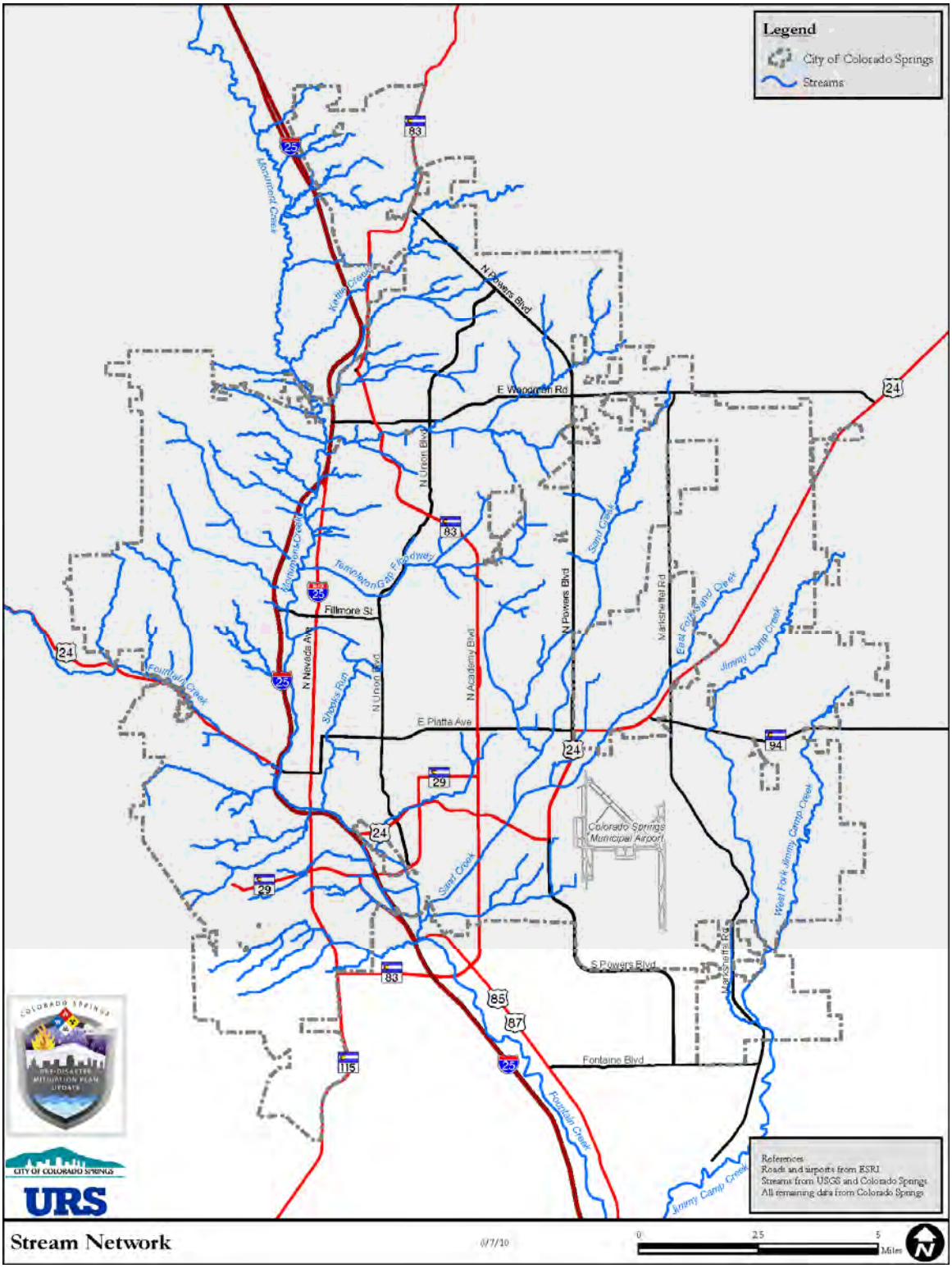
Stormwater refers to water that collects on the ground surface or is carried in the stormwater system when it rains. In runoff events where the amount of stormwater is too great for the system, or if the channel system is disrupted by vegetation or other debris that blocks inlets or pipes, excess water remains on the surface. This water may pond in low-lying areas, often in street intersections. Stormwater ponding, also known as localized flooding, may result in deep water and pollution. Stormwater can pick up debris, chemicals, dirt, and other pollutants from impervious surfaces.

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

Geographic Location

Flooding in Colorado Springs has been historically widespread geographically. Many of the rivers within the city overflow their banks during large events, which leave several areas within the city vulnerable to flooding damages. Figure 4-19 shows the geographic extent of the stream network in the City of Colorado Springs.

Figure 4-19: Stream Network for City of Colorado Springs



The following is an excerpt from the 2005 PDM Plan:

The two largest creeks in Colorado Springs are Fountain Creek and Monument Creek. Monument Creek flows south and enters the City near the Air Force Academy. Fountain Creek flows east and enters the City just east of Manitou Springs. Monument Creek empties into Fountain Creek near the intersection of I-25 and Highway 24 or just west of the downtown area. Once Monument Creek reaches this confluence it empties into Fountain Creek and the combined creek is known as Fountain Creek. The Fountain Creek then flows south to Pueblo. There are other, smaller drainages within Colorado Springs.

Previous Occurrences

Colorado Springs has a long documented history of flooding events dating as far back as 1864 and as recent as July 2009.

Figure 4-20: Monument Creek Flood 1965, View at Uintah Street Bridge

Source: Pikes Peak Library District Special Collections Photo Archives, http://library.ppld.org/SpecialCollections/Project/Search.aspx?JFile=002-3253-di-72.jpg;&view=1, accessed on November 30, 2009.

Table 4-18: Flood History for Colorado Springs

Year	Description of Event	Data Source
1864	Flooding below Cheyenne Mountain, ravines in torrents 20-30 feet deep.	FIS 1997
1878	Heavy rains from Palmer Lake cloudburst caused flooding that swept out bridges along Monument and Fountain Creeks.	FIS 1997
1882	Flood down Ute Pass in Manitou, bridges and railroad tracks destroyed, 1 victim.	2005 PDM Plan
1885	Rainfall of about 16 inches within a short time frame, 5 miles northeast of Templeton Gap.	FIS 1997

Year	Description of Event	Data Source
1886	Flood similar to that of 1885.	2005 PDM Plan
1894	Flooding of the South Platte and Arkansas River basins. High water on Fountain Creek washed away bridges, and a home at the south end of the West First Street bridge.	FIS 1997
1915	"Great Sand Creek Flood" – east Colorado Springs, 3 victims.	2005 PDM Plan
1921	Shooks Run became a river. Sand Creek and Fountain Creek were flooding farms, ranches, and houses.	FIS 1997
1922	Intense downpour over the Templeton Gap drainage area produced 6 inches of rain. A residential district in the eastern portion of the city was inundated, causing $59,700 in damages.	FIS 1997
1929	College Gulch flooded by 15 ft. wall of water caused by the breaking of dams on Ute Pass Fish Club – wiped out Crystola, Midland tracks, 1 victim.	2005 PDM Plan
1932	Maximum known flood in the Templeton Gap area. Caused over $144,000 in damages. This storm flooded most of northern Colorado Springs.	FIS 1997
1935	Memorial Day Flood, Largest recorded flood: 55,000 cfs on Fountain Creek above the confluence with Jimmy Camp Creek. This storm also caused the largest flood known on Monument Creek at 50,000 cfs. In Colorado Springs, Monument Creek attained its peak flow within 2.5 hours. The flow rate of this flood exceeded the estimated 500-year peak flow rate. At least 4 lives were lost to this flood.	El Paso County Flood Insurance Study, 1997 (FIS '97)/2005 PDM Plan
1935	Monument Creek flood from half a dozen cloudbursts. Four lives lost in Colorado Springs, and property damage was estimated at $1,215,000 by the City Engineer.	FIS 1997
1965	Jimmy Camp Creek flood, with estimated peak discharge of 124,000 cfs 4.5 miles above the confluence with Fountain Creek. This recurrence interval was far exceeding 500 years.	FIS 1997
1965	Flash Floods cause major landslide at Cheyenne Mountain Zoo. Flood resulted in four fatalities and caused major destruction in currently developed areas.	2005 PDM Plan
1970	Flash floods cover Constitution Ave. to Fountain Blvd., 1 victim.	2005 PDM Plan
1970	9-11" of rain cause flooding and rock slides in Rock Creek Canyon.	2005 PDM Plan
1972	Jimmy Camp Creek washout, $50,000 damages to roads and bridges.	2005 PDM Plan
1979	Flooding causing minimal damages.	SHELDUS*
1980	Flooding causing $250,000 in damages.	SHELDUS*
1981	Flooding causing $50,000 in damages.	SHELDUS*
1985	I-25 closed down, nearly 2-5" of rain, Gold Camp and Old Stage Roads closed.	2005 PDM Plan
1994	Flash flooding in Colorado Springs. On June 2nd, many roads were closed due to the high water. Two people slightly injured when they tried to drive their vehicles across rushing water over a dip in a road and were washed away. Damages to a local golf course.	NCDC
1994	Flooding of streets in Colorado Springs, June 20.	NCDC
1994	Flash flooding causing overflow at west entrance to Peterson Air Force Base.	NCDC
1994	Water washed rocks from a hillside onto a highway. Road was closed, and several cars were washed into the ditch, September 3.	NCDC
1995	Northern and eastern Colorado Springs had at least six inches of water covering many streets. Many locations received over 2" of rain in 3 hours. $1 million in damages.	NCDC/ SHELDUS*
1996	Moist upslope flow aided in the development of strong thunderstorms along the Front Range on May 24th. Some areas near the airport received 2 ½" of rain in as many hours.	NCDC
1996	July 26, very heavy rain of 1 to 3" caused flooding of roads and underpasses. Vehicles were partially submerged at the intersection of Walnut Street and Colorado Avenue.	NCDC
1997	On June 9th, Heavy thunderstorms dumped rain on Fountain and Cheyenne Creek Basins, causing flash floods and a prolonged period of high water.	NCDC
1997	Flooding of Interstate 25 and Highway 85/87 on June 13th. Flooding of Fountain Creek just south of Downtown Colorado Springs.	NCDC

Year	Description of Event	Data Source
1997	Heavy thunderstorm rains across Colorado Springs on August 4th. Produced urban and small stream flooding causing drainage ditches to run rapidly and swell to levels of 6 to 8 feet. Two boys were swept by the fast flowing water; one of them, 6 year old Steven Powell, drowned and was found the next morning.	NCDC/ SHELDUS*
1998	Vehicles stalled and businesses flooded. On July 30th, flood waters left up to a foot of mud in low lying areas, swept away fencing and washed away landscaping. A rock and mud slide blocked Highway 24 one mile north of Manitou Springs.	NCDC
1998	Slow moving thunderstorms produced heavy rainfall across parts of the city resulting in numerous reports of street flooding. Some intersections were under 12 to 18 inches of water.	NCDC
1999	Flash flooding caused street flooding, basement flooding, and evacuated some residents due to potential electrical problems.	NCDC
1999	Flooding causing $32,565,151 in damages from April 29th to May 1st. Over $327,000 in damages to crops. USACE considered this a 10-year event. The bridge at 21st Street over Fountain Creek was closed for 3 weeks for repairs.	2005 PDM Plan/NCDC /SHELDUS*
2000	Heavy rains flooded streets.	NCDC
2001	Intense rainfall, at times exceeding 2 inches per hour, caused serious flooding concentrated near downtown Colorado Springs. Interstate 25 at the Bijou Street bridge flooded when the water pump failed due to a lightning strike. The Highway was closed for about 10 hours and traffic was rerouted through downtown Colorado Springs.	NCDC
2002	Slow moving thunderstorms dropped 1 to 3 inches over much of Colorado Springs causing flooding of Fountain Creek.	NCDC
2004	Flash flooding caused streets to become flooded along with water coming out of manhole covers, stalling vehicles.	NCDC
2004	Flooding of streets, intersections. Vehicles floating and/or abandoned. Many streets were closed, including the underpass at mile-marker 123 on I-25. $200,000 in damages.	NCDC/ SHELDUS*
2005	A severe thunderstorm moved across the eastern side of the city, causing copious amounts of hail and rain. Two teenage boys drowned when they were taken by a wave of water in a drainage culvert on Cottonwood Creek near Woodmen Road. Near the Citadel Mall, a 3 to 4 foot deep lake developed with massive amounts of hail pouring into the deep water. Some motorists and passengers suffered minor hypothermia in the icy cold water. $100,000 in damages.	NCDC/ SHELDUS*
2005	Heavy rains caused 2 to 2.5 feet of water to run over roadways, stranding several vehicles.	NCDC
2007	1 to 3 inches of rain in less than 2 hours caused flooding of roads. Water depths around one foot were reported around Powers Blvd. and in the Stetson Hills subdivision.	NCDC
2008	Roads closed due to high water, when 4 inches of rain pounded the east side of the city. Fountain Creek reached flood stage. $20,000 in damages.	NCDC/ SHELDUS*
2009	May 22nd, heavy rains brought flash flooding to South Cheyenne Canyon causing mud and rock slides and flooding of a road.	NCDC
2009	May 24th, heavy rains flooded streets. There was water up to car windows at the intersection of South Walnut and West Cucharras.	NCDC
2009	July 26th, heavy rains flooded streets. Water up to 10 inches deep was noted at the intersection of Tutt and Constitution.	NCDC

* Data from SHELDUS are by county, therefore exact location is unknown. Some records may not be applicable to Colorado Springs specifically. Damage estimates provided by SHELDUS are divided amongst the affected county; as for disasters that affected multiple counties.

National Flood Insurance Program

There were 1,067 flood insurance policies in force in Colorado Springs as of November 30, 2009. In 2005, there were 973 active policies thus reflecting a slight increase in participation. FEMA is currently updating the FIRMs for El Paso County and new floodplain limits are expected to be published in 2011. Changes in the number of policies are expected following the effective date of the new DFIRMs.

Table 4-19: NFIP Status for Colorado Springs

Jurisdiction	Date Joined	Effective FIRM Date	Policies in Force	Insurance in Force ($)	Number of Claims	Claims Total ($)
Colorado Springs	12/18/86	3/17/97	1,067	$218,502,600	179	$325,890

Source: National Flood Insurance Program BureauNet, http://bsa.nfipstat.com/comm_status/index.htm, http://bsa.nfipstat.com/reports/1011.htm#COT, and http://bsa.nfipstat.com/reports/1040.htm, all on February 5, 2010.

The NFIP also tracks repetitive loss properties throughout the United States. According to their database, there are six repetitive loss properties in the City of Colorado Springs as of January 6, 2010.[11]

Table 4-20: Repetitive Loss Properties in Colorado Springs

Occupancy	Number
Single-Family Residential	4
Residential, Duplex	1
Commercial, Office	1

NFIP database, emails from Jen Sparenberg, URS Linthicum, January 6, 2010 and February 15, 2010.

Community Rating System

Colorado Springs participates in the Community Rating System Program of the NFIP. This program is an incentive program developed by the NFIP to raise awareness of flood insurance, promote accurate insurance ratings, and ultimately reduce flood losses. The City of Colorado Springs holds a current class rating of 8 as of October 1, 2009.[12] This means that properties within Special Flood Hazard Areas (SFHA) are eligible for a 10% discount on flood insurance policies. The highest achievable rating is a 1, where SFHA properties are eligible for a 45% discount on flood insurance policies. The lowest rating is a 10, where the community is not participating. There are 18 credible activities within four categories to increase a jurisdiction's rating. The categories include: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. The City of Colorado Springs, through the Pikes Peak Regional Building Department as the floodplain administrator, is currently seeking to achieve a rating of 6.

[11] NFIP database, emails from Jen Sparenberg, URS Linthicum, January 6, 2010 and February 15, 2010.
[12] FEMA Community Rating System website, http://www.fema.gov/business/nfip/crs.shtm, accessed on November 25, 2009.

Probability of Future Occurrence

For the purposes of this Plan, the Planning Subcommittee decided to break out flooding events into two distinct categories: frequent floods that are typical of the area, flooding streets, overtopping curbs, and causing minimal damages; and significant flooding defined by an event that causes significant damages to properties, involves streams overflowing their banks, and can include the 100- and 500-year flood interval. The probability of the two categories is as follows:

Typical Flood

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

Based on historical data for previous occurrences in Colorado Springs, there were 48 (typical and significant) flooding events that occurred within a 145-year period. This equates to a probability of 33% that a flood will occur in any given year, or that a flood will occur approximately once every 3 years. Typical flooding events in Colorado Springs flood streets, cause stream bank erosion, wash out bridges, disable automobiles, and cause limited damages to property. The Planning Subcommittee confirmed that some sort of flooding usually occurs within the city every year.

Significant Flood

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

When taken literally, the 500-year flood event should occur once every 500 years, or have a 0.2% chance of occurring in any given year. The 100-year flood event should occur once every 100 years, or have a 1% chance of occurring in any given year. The likelihood of a more significant flood such as a 50- or 100-year flood is far less than the typical flood.

Magnitude/Severity

As with probability, the Planning Subcommittee decided to break out flooding events into two distinct categories for measuring magnitude: frequent floods that are typical of the area, flooding streets, overtopping curbs, and causing minimal damages; and significant flooding defined by an event that causes significant damages to properties, involves streams overflowing their banks, and can include the 100- and 500-year flood interval. The magnitude of the two categories is as follows:

Typical Flood

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*

Significant Flood

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*

Most of the flooding events in Colorado Springs have caused property damages, flooded roadways, and stalled vehicles. These damages are fairly limited in magnitude, as services are interrupted for brief periods, and there are few if any injuries. However, significant flooding events, such as the floods of 1935, 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.

Figure 4-21: Memorial Day Flood of 1935, View from West Colorado Avenue

Source: Pikes Peak Library District Special Collections Photo Archives, http://library.ppld.org/SpecialCollections/Project/Search.aspx?JFile=001-4599-di-72.jpg;&view=1, accessed on November 30, 2009.

Vulnerability Assessment

Overall Summary and Impacts: Flooding will certainly continue to impact the City of Colorado Springs. For the purposes of this study, HAZUS-MH was used to estimate potential losses and to model floodplains based on the provided digital elevation model. HAZUS estimated that there are 2,503 structures in the 500-year floodplain. HAZUS estimates that more damages would occur to residential buildings than any other occupancy types.

Because the resulting HAZUS data often assumes that a flood event covers the entire City and are not localized events, the Subcommittee also used City parcel data, amongst other data, to provide comparative analysis by stream. When using modeled floodplains together with City data, there are 6,750 structures in the 500-year floodplain. Nearly 7,000 parcels within the modeled 500-year floodplain have an estimated market value of over $2 Billion, including improvements. When the Digital Flood Insurance Rate Maps are effective for El Paso County (Estimated 2011), it will be important to reassess the estimated vulnerability based on those new floodplains.

The City of Manitou Springs, west of Colorado Springs, has limited flood protection measures in place, and therefore could adversely affect Colorado Springs during a flood event. Homes, cars, and other debris that may be in the floodway will be carried down Fountain Creek toward the city potentially exacerbating the situation for Colorado Springs.

Identifying Structures and Estimating Potential Losses (HAZUS Results): In order to model the floodplains, and subsequently estimate damages associated with a particular event, HAZUS software requires a defined region. For this study, results were desired at the census block level; therefore the region was defined by all census blocks within the City of Colorado Springs. Because census blocks are not aligned with city boundaries, the modeled region is larger than that of the City of Colorado Springs and therefore estimated damages may be slightly skewed. Figure 4-22 shows the modeled flood region, and Figure 4-23 and Figure 4-24 show the resulting modeled floodplains for the 2-, 10-, 100-, and 500-year floodplains. The modeled flood region is 292 square miles, and contains 5,384 census blocks. The region, according to 2000 Census Bureau Data, contains over 146,000 households and has a total population of 374,708 people. There are an estimated 133,883 buildings in the region with a total building replacement value (excluding contents) of $27,338,000,000 (2006 dollars). Approximately 91% of the buildings and 75% of the building value are associated with residential uses.

The floodplains resulting from the HAZUS flood modeling analysis are provided in a series of map tiles in Appendix F: Flood Hazard Modeling Results. The methodology used for HAZUS modeling is provided in Appendix G: References.

Figure 4-22: Modeled Flood Region

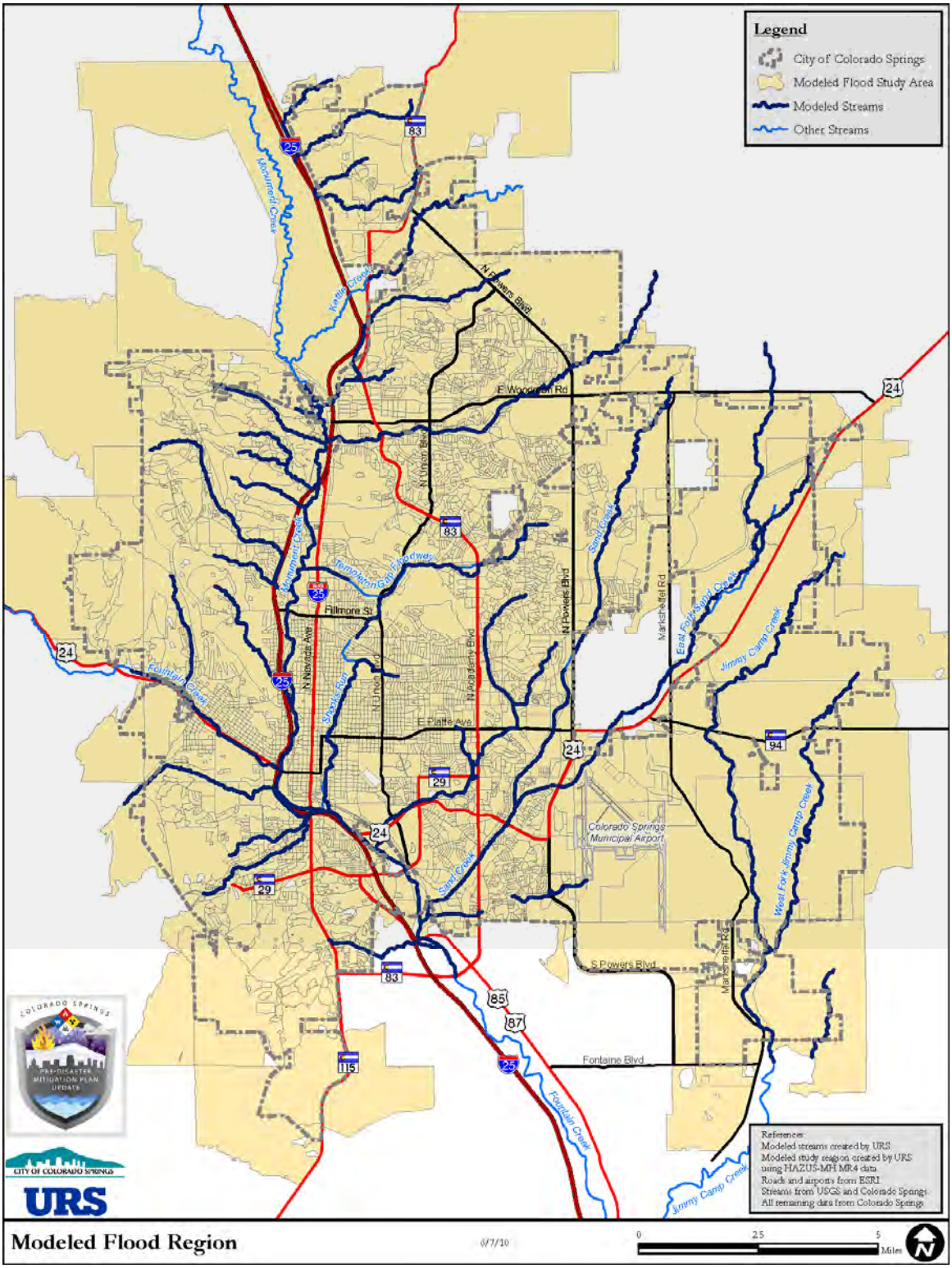


Figure 4-23: Modeled Floodplains (2- and 10-year)

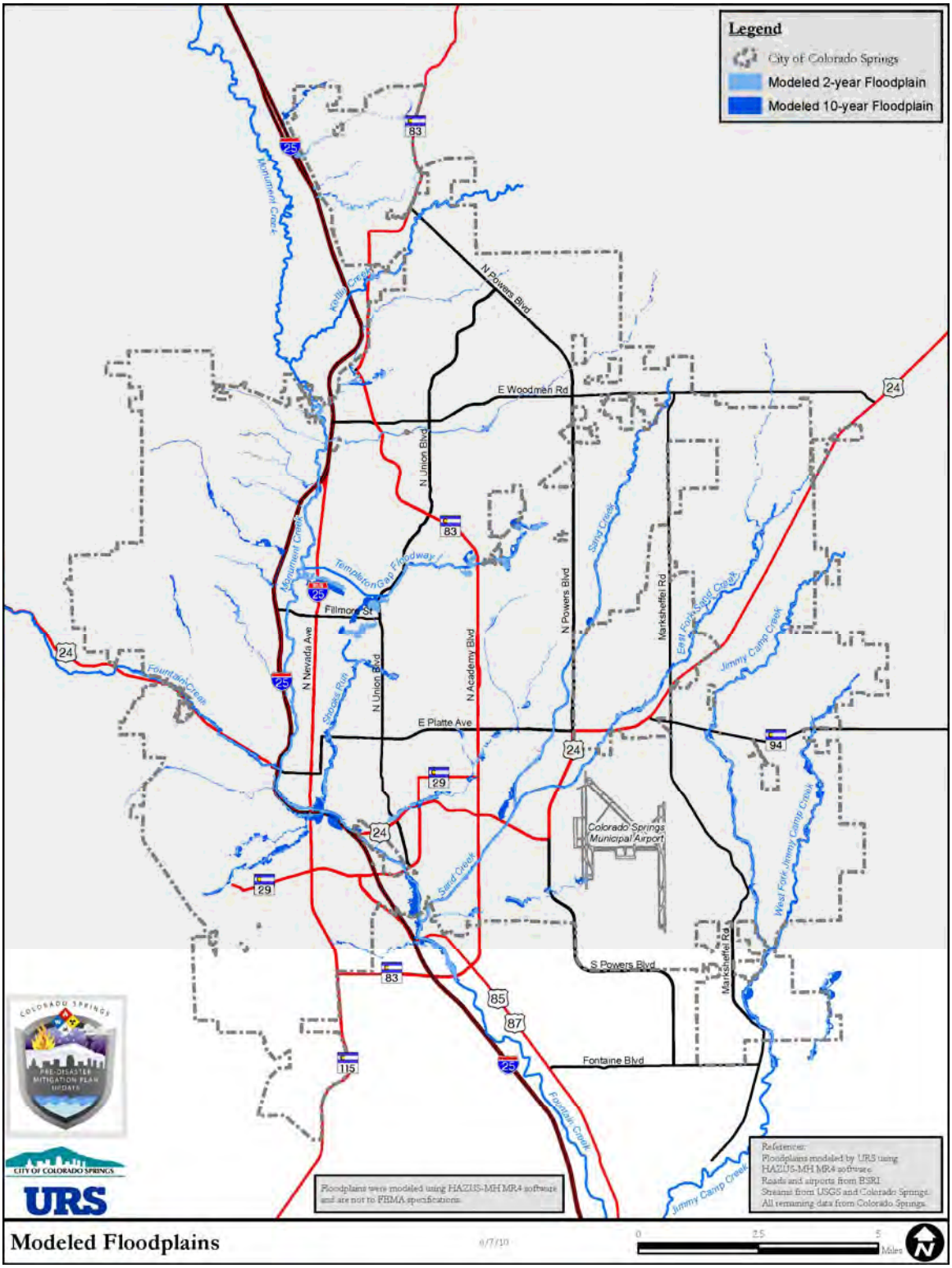
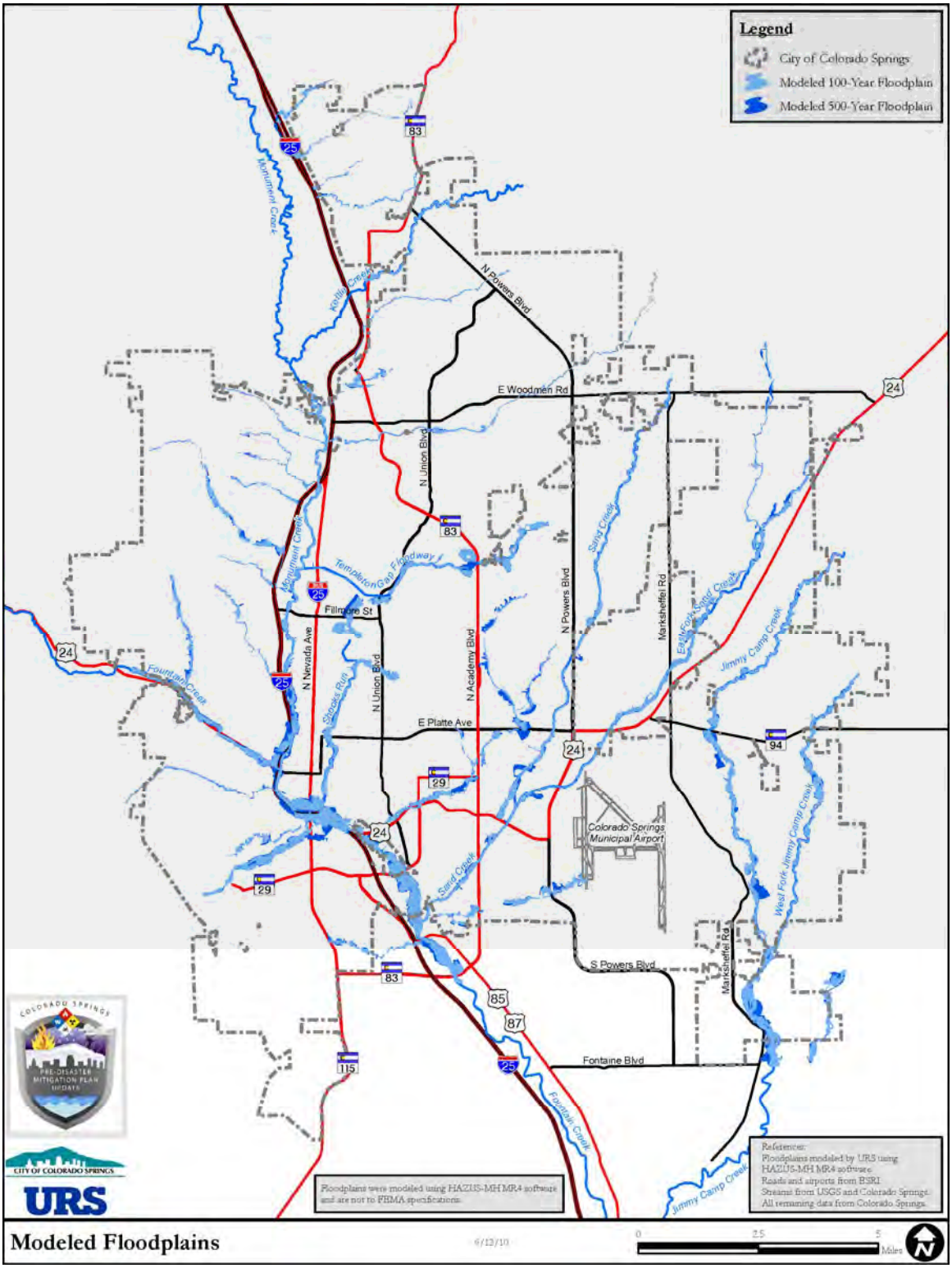


Figure 4-24: Modeled Floodplains (100- and 500-year)



HAZUS provides reports on the number of buildings impacted, building repair costs, and the associated loss of building contents and business inventory. Building damage can also cause function losses to a community, which relate to the opportunity loss of being able to use a building. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS using a methodology based on the building damage estimates. Flood damage is directly related to the depth of flooding. For example, a two-foot flood results in approximately 20 percent of the structure being damaged (which translates to 20 percent of the structure's replacement value). For Table 4-21 to Table 4-27, the results are for comparative analysis only. The results in these tables assume that a flood event occurred throughout the entire modeled region, rather than localized events on a by-stream analysis.

Table 4-21: Damage Summary by Building Occupancy (% of total building square footage damaged)

Occupancy Type	Percentage of total damaged building square footage			
	2-year flood	10-year flood	100-year flood	500-year flood
Agriculture	0.77 %	0.88 %	0.85 %	0.68 %
Commercial	28.79 %	25.26 %	25.27 %	26.25 %
Industrial	8.54 %	7.79 %	6.25 %	6.29 %
Residential	46.38 %	60.35 %	64.17 %	63.73 %
Religion	2.29 %	1.46 %	1.68 %	1.60 %
Education	7.60 %	1.23 %	0.86 %	0.84 %
Government	5.63 %	3.02 %	0.92 %	0.61 %
TOTAL %	100.00 %	100.00 %	100.00 %	100.00 %
Total Damaged Square Feet	**1,785,320**	**4,754,210**	**6,934,490**	**9,131,110**

Table 4-22: Structures Damaged During Modeled Flood Events (HAZUS Results)

Event	Number of Structures in Floodplain	Number of Structures Damaged	% of Total Structures in Modeled Region
2-year	959	263	0.2 %
10-year	1,494	832	0.6 %
100-year	1,914	1,302	0.9 %
500-year	2,503	1,741	1.3 %

Table 4-23: Damage Estimates and Economic Losses for Modeled Flood Events

Damage Type	2-year	10-year	100-year	500-year
Building Damage	$41,790,000	$117,770,000	$193,090,000	$270,190,000
Contents Damage	$59,240,000	$151,890,000	$246,730,000	$343,430,000
Inventory Loss	$2,110,000	$5,160,000	$7,130,000	$10,450,000
Income Loss	$170,000	$420,000	$800,000	$1,130,000
Relocation Loss	$80,000	$270,000	$460,000	$640,000
Rental Income Loss	$20,000	$100,000	$190,000	$310,000
Wage Losses	$630,000	$1,570,000	$2,760,000	$3,150,000
TOTAL LOSSES	**$104,060,000**	**$277,170,000**	**$451,160,000**	**$629,280,000**

Table 4-24: Expected Square Footage Damaged (sf), 2-year event

Occupancy	Percent damaged (sf) 1-10%	11-20%	21-30%	31-40%	41-50%	Substantially
Agriculture	3,050	7,020	2,450	690	290	320
Commercial	64,090	253,280	132,790	37,310	15,940	10,510
Industrial	14,620	55,950	31,250	25,360	14,900	10,460
Residential	35,150	110,070	302,060	119,410	125,650	135,620
Religion	6,780	30,040	1,560	1,380	740	380
Education	42,590	80,380	8,120	2,420	840	1,280
Government	7,950	32,950	42,370	10,590	4,430	2,280
TOTAL (sf)	**174,230**	**569,690**	**520,600**	**197,160**	**162,790**	**160,850**

Table 4-25: Expected Square Footage Damaged (sf), 10-year event

Occupancy	Percent damaged (sf) 1-10%	11-20%	21-30%	31-40%	41-50%	Substantially
Agriculture	13,120	11,290	5,550	4,890	3,860	3,230
Commercial	172,710	632,610	153,640	84,010	35,440	122,730
Industrial	18,190	123,270	66,460	57,110	34,070	71,330
Residential	67,890	403,160	1,231,800	370,100	423,100	372,990
Religion	9,820	49,390	2,450	2,100	900	4,960
Education	34,000	22,890	680	270	240	350
Government	20,480	37,590	59,910	18,990	6,640	0
TOTAL (sf)	**336,210**	**1,280,200**	**1,520,490**	**537,470**	**504,250**	**575,590**

Table 4-26: Expected Square Footage Damaged (sf), 100-year event

Occupancy	Percent damaged (sf) 1-10%	11-20%	21-30%	31-40%	41-50%	Substantially
Agriculture	4,300	15,050	14,030	15,480	4,300	5,570
Commercial	215,170	982,880	241,950	140,760	90,700	81,100
Industrial	23,760	156,060	76,090	67,750	54,440	55,280
Residential	92,270	576,210	1,780,560	710,410	764,760	525,800
Religion	21,570	75,570	4,520	2,790	5,220	6,720
Education	44,340	11,250	1,840	760	510	1,090
Government	13,290	32,110	4,620	4,340	3,260	6,010
TOTAL (sf)	**414,700**	**1,849,130**	**2,123,610**	**942,290**	**923,190**	**681,570**

Table 4-27: Expected Square Footage Damaged (sf), 500-year event

Occupancy	Percent damaged (sf) 1-10%	11-20%	21-30%	31-40%	41-50%	Substantially
Agriculture	5,600	14,200	7,910	4,860	8,070	21,700
Commercial	230,890	1,235,800	368,180	199,620	124,180	238,460
Industrial	18,030	172,440	117,460	81,700	66,390	118,660
Residential	176,680	696,190	2,178,800	990,460	1,044,530	732,500
Religion	18,950	95,170	5,920	2,550	3,590	19,760
Education	51,780	17,100	3,240	970	820	2,580
Government	2,680	27,640	8,570	3,980	3,320	9,180
TOTAL (sf)	**504,610**	**2,258,540**	**2,690,080**	**1,284,140**	**1,250,900**	**1,142,840**

Mapping sets for each of the modeled flood scenarios showing buildings and critical facilities are included in Appendix F: Flood Hazard Modeling Results. Table 4-28 shows the estimated losses for each flood scenario on each stream based on the HAZUS modeling. Some of the results in the table may be grossly inflated due to double-counting. HAZUS estimates losses based on census block aggregate data, therefore there are instances where multiple modeled streams may include losses from the same census block. If a flood scenario (floodplain polygon) intersects a census block, it will count the aggregate losses for that census block for that particular event. In addition, several anomalies occurred due to an inaccurate digital elevation surface. Those are noted in bold in Table 4-28. Because so many of the estimated losses were skewed, it was valuable for the Subcommittee to provide additional analysis using parcel data.

Table 4-28: Losses by Modeled Stream – HAZUS Estimates

	HAZUS Estimated Losses ($ US Dollars)			
Stream Name	**2-year**	**10-year**	**100-year**	**500-year**
Bear Creek	2,483,000	3,125,000	3,333,000	8,052,000
Black Squirrel Creek	227,000	31,000	466,000	638,000
Camp Creek	453,000	640,000	2,470,000	4,758,000
Cheyenne Creek	4,635,000	28,417,000	44,774,000	60,229,000
Cheyenne Run	2,103,000	13,284,000	21,737,000	17,647,000
Cottonwood Creek	7,479,000	8,020,000	13,896,000	10,976,000
Douglas Creek North	163,000	13,091,000	17,561,000	17,484,000
Douglas Creek South	2,561,000	5,945,000	8,167,000	7,645,000
Dry Creek	2,587,000	3,579,000	4,297,000	5,437,000
Fishers Canyon	980,000	1,928,000	2,646,000	2,863,000
Fountain Creek	7,862,000	45,967,000	84,211,000	145,648,000
Jimmy Camp Creek	4,000	42,000	99,000	150,000
Jimmy Camp Creek Corral Trib.	0	15,000	18,000	30,000
Jimmy Camp Creek East Trib.	0	22,000	26,000	21,000
Kettle Creek	288,000	114,000	222,000	318,000
Mesa Creek	5,345,000	4,602,000	4,857,000	4,809,000
Middle Tributary	160,000	171,000	334,000	392,000
Monument Branch	644,000	757,000	1,014,000	790,000
Monument Creek	19,784,000	27,613,000	62,422,000	90,967,000
N. Rockrimmon Creek	10,057,000	7,928,000	5,868,000	7,995,000
Peterson Field	1,173,000	6,878,000	7,621,000	7,515,000
Pine Creek	7,389,000	6,015,000	8,690,000	9,702,000
S. Rockrimmon Creek	2,347,000	1,232,000	2,474,000	6,570,000
Sand Creek	11,071,000	23,986,000	37,342,000	87,751,000
Shooks Run	6,037,000	22,310,000	35,855,000	44,892,000
Smith Creek	0	564,000	694,000	828,000
Spring Creek	10,794,000	18,092,000	29,713,000	31,980,000
Templeton Gap Floodway	54,282,000	73,545,000	76,677,000	70,098,000
Upper (West) Fountain Creek	2,227,000	5,503,000	29,733,000	42,872,000
Woodmen Valley	448,000	385,000	679,000	936,000
TOTALS *	**$163,583,000**	**$323,801,000**	**$507,896,000**	**$689,993,000**

* HAZUS estimates losses based on census block aggregate data, therefore there are instances where multiple modeled streams may include losses from the same census block. If a flood scenario (floodplain polygon) intersects a census block, it will count the aggregate losses for that census block for that particular event. Those streams in bold indicate that the results are skewed due to the digital surface elevation.

Critical Facilities and Infrastructure: HAZUS software uses nationwide databases to estimate the number of critical facilities within a defined region. This is one of the major limitations of HAZUS, as the data rarely depicts the accurate count of essential facilities within a jurisdiction. According to the HAZUS modeling, there are multiple essential facilities located within the defined HAZUS region, including five hospitals, 193 schools, 15 fire stations, 13 police stations, and one Emergency Operation Center (EOC). Expected damages to essential facilities are described in the following tables.

Table 4-29: Essential Facility Damages, HAZUS Flood Results 100-yr. event

Facility Type	Total Number of Facilities in the City (HAZUS)	Number of Damaged Facilities 2 - year	Number of Damaged Facilities 10 - year	Number of Damaged Facilities 100 - year	Number of Damaged Facilities 500 - year
Fire Stations	15	0	0	0	0
Hospitals	5	0	0	0	0
Police Stations	13	0	0	0	0
Schools	193	0	3	4	5

The number of essential facilities within the City of Colorado Springs, according to city data, is shown in Table 4-30. For the next Plan Update, importing the city data into HAZUS modeling may provide a more accurate estimation of damages to these facilities.

Table 4-30: Essential Facilities – City of Colorado Springs

Type of Facility	Total Number of Facilities
Police Stations	6
Fire Facilities	41
EOCs	5
Hospitals	10
Schools	163
Dams (that could affect city)	33
Major Bridges	208
Communication Towers	63 (including some outside the city limits but within 5 miles)
City Buildings	1,884 (not all essential)
Wastewater Treatment Facilities	2
Wastewater Storage Facilities	9
Public Airports	1

Source: City of Colorado Springs, GIS data

The following table summarizes the HAZUS estimates for shelter requirements following major flood events in the modeled region.

Table 4-31: Shelter Requirements Following a Flood (HAZUS Results)

Event	Households Displaced	Population Seeking Shelter
2-year	1,166	2,086
10-year	2,781	6,282
100-year	3,849	9,039
500-year	4,791	11,550

Identifying Structures and Estimating Potential Losses (Parcel Analysis): Using GIS overlay tools, the team also performed a parcel and building analysis using the City of Colorado Springs parcel and buildings data compared with the floodplains generated through the HAZUS modeling software. The results are as follows, and are specific to the City of Colorado Springs, rather than the region defined for the model.

Table 4-32: Summary of Parcel and Building Analysis – Flooding in Colorado Springs (*Parcel Analysis*)

Category	2-year	10-year	100-year	500-year
Parcels in Floodplain	2,596	4,061	5,562	6,880
Buildings in Floodplain	1,503	3,334	4,969	6,750
Market Value of Parcels in Floodplain	$986,623,461	$1,401,975,601	$1,798,823,315	$2,042,937,804

There are 6,750 buildings on 6,880 parcels in the City of Colorado Springs that intersect the modeled 500-year floodplain and are therefore vulnerable to damages. The market value of these parcels with improvements is nearly $2.1 Billion, nearly five percent of the total market value of all parcels in the City of Colorado Springs. Table 4-33 summarizes the number of buildings that are intersected by the modeled flood plains resulting from the HAZUS modeling. The data for Table 4-33 and Table 4-34 were generated from four separate and distinct pairs of HAZUS-MH flood model runs. Each HAZUS-MH flood model run pair, consisting of a single discharge run and a Level 1 run, corresponds to a specific flood recurrence interval (2-year flood, 10-year flood, 100-year flood, and 500-year flood) for a single hypothetical (i.e. modeled) storm that is centered over all areas of the City. The inputs to each HAZUS-MH flood model run included the specific discharge at certain locations along stream reaches per the Fountain Creek Watershed Study, as well as discharges calculated automatically by HAZUS-MH for reaches not included in the Watershed Study, and a digital elevation surface.

In most cases the number of structures impacted along each stream increases as the flood event becomes larger in magnitude. However, four streams do not fit this trend: Black Squirrel Creek, Camp Creek, Monument Branch, and Templeton Gap Floodway. The main reason for this discrepancy is primarily due to an inaccurate digital elevation surface that does not adequately represent the actual ground surface near these streams. This issue is most prominent along the Templeton Gap Floodway so we have supplemented the table with separate count of structures calculated from a more accurate 100- and 500-year floodplain of Templeton Gap Floodway provided by the City of Colorado Springs.

Table 4-33: Number of Buildings Intersected by Each Floodplain by Stream *(Parcel Analysis)*

	Number of Buildings within Modeled Floodplains			
Stream Name	**2-year**	**10-year**	**100-year**	**500-year**
Bear Creek	0	3	7	9
Black Squirrel Creek	2	0	2	2
Camp Creek	12	9	76	215
Cheyenne Creek	69	466	782	966
Cheyenne Run	26	119	135	177
Cottonwood Creek	4	7	13	16
Douglas Creek North	11	121	203	246
Douglas Creek South	5	7	19	22
Dry Creek	0	0	1	19
Fishers Canyon	0	24	41	93
Fountain Creek	9	110	318	502
Jimmy Camp Creek	0	0	0	1
Kettle Creek	0	0	0	0
Mesa Creek	3	6	9	21
Middle Tributary	1	1	1	1
Monument Branch	8	6	8	6
Monument Creek	1	4	144	381
N. Rockrimmon Creek	2	5	10	18
Peterson Field	111	287	491	523
Pine Creek	19	21	24	32
S. Rockrimmon Creek	1	1	1	1
Sand Creek	46	206	455	1220
Shooks Run	129	402	525	636
Spring Creek	21	51	78	112
Templeton Gap Floodway (HAZUS)*	1,014	1,380	1,366	1,224
T. Gap Floodway (City Q3 data)*	n/a	n/a	126	334
Upper (West) Fountain Creek	9	98	260	307
Woodmen Valley	0	0	0	0
TOTALS**	**1,503**	**3,334**	**4,969**	**6,750**

* For the Templeton Gap Floodway, modeling anomalies resulted in inaccurate floodplains based on the digital elevation model. For this reason, City-provided Q3 data was used to estimate number of structures (available only for 100- and 500-year event).
**Totals include HAZUS analysis only, not city-provided data for Templeton Gap Floodway.

Table 4-34 summarizes the value of parcels that are intersected by the modeled floodplains from the HAZUS modeling. **These are not estimated losses.**

Table 4-34: Estimated Market Values of Parcels within Each Floodplain by Modeled Streams *(Parcel Analysis)*

	Estimated Market Value of Parcels within Floodplain ($ US Dollars)			
Stream Name	**2-year**	**10-year**	**100-year**	**500-year**
Bear Creek	$14,585,047	$14,585,047	$14,585,047	$15,033,304
Black Squirrel Creek	$3,018,503	$464,150	$902,785	$1,236,786
Camp Creek	$5,314,761	$6,391,368	$44,373,822	$59,007,701
Cheyenne Creek	$51,955,146	$103,549,097	$144,670,490	$171,558,898
Cheyenne Run	$44,319,341	$66,080,074	$69,708,571	$82,737,523
Cottonwood Creek	$8,739,342	$26,945,859	$34,594,982	$36,430,940
Douglas Creek North	$8,483,569	$86,688,638	$115,049,854	$115,653,000
Douglas Creek South	$29,277,376	$32,025,624	$41,371,660	$41,398,378
Dry Creek	$12,829,344	$16,136,231	$30,432,839	$37,439,392
Fishers Canyon	$2,338,645	$20,707,780	$25,741,990	$38,614,380
Fountain Creek	$71,009,386	$77,076,800	$97,819,216	$126,467,742
Jimmy Camp Creek	$175,401	$175,401	$175,401	$175,401
Kettle Creek	$183,593	$708,520	$1,218,788	$1,481,232
Mesa Creek	$8,807,778	$11,014,107	$12,248,813	$18,012,055
Middle Tributary	$39,004,721	$39,664,510	$40,046,783	$40,595,211
Monument Branch	$35,973,804	$37,033,031	$36,591,357	$36,591,357
Monument Creek	$53,785,075	$79,533,854	$141,392,633	$159,973,018
N. Rockrimmon Creek	$14,296,973	$37,323,167	$38,531,130	$43,070,304
Peterson Field	$37,958,188	$48,155,065	$62,279,403	$58,286,678
Pine Creek	$115,436,773	$125,906,136	$139,281,130	$139,580,594
S. Rockrimmon Creek	$33,950,110	$33,372,399	$33,950,110	$33,950,110
Sand Creek	$64,270,206	$145,470,377	$204,699,358	$349,485,532
Shooks Run	$31,366,142	$66,728,093	$76,905,515	$84,415,571
Spring Creek	$43,689,713	$51,014,939	$67,404,383	$86,892,920
Templeton Gap Floodway	$238,162,859	$254,054,617	$283,111,064	$218,454,300
T. Gap Floodway (based on City data)*	n/a	n/a	$60,297,332	$89,304,821
Upper (West) Fountain Creek	$14,134,216	$17,613,268	$38,178,742	$42,838,028
Woodmen Valley	$3,557,449	$3,557,449	$3,557,449	$3,557,449
TOTALS**	**$986,623,461**	**$1,401,975,601**	**$1,798,823,315**	**$2,042,937,804**

* For the Templeton Gap Floodway, modeling anomalies resulted in inaccurate floodplains based on the digital elevation model. For this reason, City-provided Q3 data was used to estimate market value of parcels (available only for 100- and 500-year event).
**Totals based on HAZUS analysis only, not city-provided data for Templeton Gap Floodway.

Based on the improved use field from the assessor's database, there are an estimated 5,314 residential uses within the 500-year floodplain that could be potentially damaged during a major flood event. For Table 4-35, the residential land uses (housing units) were multiplied by 2.5 to estimate the number of people seeking shelter. These results differ from the population seeking shelter in the HAZUS results because the parcel analysis assumed 2.5 persons per household and was based on the parcel rather than the census block aggregate data used by HAZUS

Table 4-35: Potential Shelter Requirements Following Flood *(Parcel Analysis)*

	Potential Households Displaced / Potential Population Seeking Shelter							
Stream Name	**2-year**		**10-year**		**100-year**		**500-year**	
Bear Creek	4	10	4	10	4	10	4	10
Black Squirrel Creek	5	13	5	13	5	13	5	13
Camp Creek	19	48	18	45	133	333	221	553
Cheyenne Creek	167	418	414	1,035	616	1,540	729	1,823
Cheyenne Run	89	223	179	448	205	513	244	610
Cottonwood Creek	19	48	38	95	50	125	59	148
Douglas Creek North	44	110	177	443	289	723	303	758
Douglas Creek South	25	63	36	90	68	170	69	173
Dry Creek	50	125	62	155	116	290	143	358
Fishers Canyon	13	33	84	210	117	293	156	390
Fountain Creek	4	10	46	115	115	288	208	520
Jimmy Camp Creek	2	5	2	5	2	5	2	5
Kettle Creek	1	3	3	8	5	13	6	15
Mesa Creek	7	18	14	35	24	60	35	88
Middle Tributary	4	10	6	15	7	18	9	23
Monument Branch	30	75	33	83	32	80	32	80
Monument Creek	24	60	36	90	103	258	184	460
N. Rockrimmon Creek	18	45	33	83	35	88	53	133
Peterson Field	24	60	118	295	101	253	111	278
Pine Creek	29	73	31	78	34	85	55	138
S. Rockrimmon Creek	2	5	2	5	2	5	2	5
Sand Creek	161	403	311	778	525	1,313	1,106	2,765
Shooks Run	137	343	294	735	355	888	411	1,028
Spring Creek	39	98	52	130	80	200	97	243
Templeton Gap	822	2,055	1,022	2,555	1,154	2,885	964	2,410
Upper (West) Fountain	26	65	34	85	82	205	98	245
Woodmen Valley	8	20	8	20	8	20	8	20
TOTALS	**1,773**	**4,439**	**3,062**	**7,659**	**4,267**	**10,674**	**5,314**	**13,292**

Future Development: The following is an excerpt from the 2005 PDM Plan:

The majority of development in Colorado Springs will occur in large open spaces to the east and northeast of town. No new structure can be built in the floodway portion of a flood zone. Structures in the flood zone that are damaged more than 49% must comply with regulations that require flood proofing or elevation as a means of mitigation.

Future development is controlled by existing and forthcoming revised regulations but existing structures will be at risk unless removed from the flood area. The local government agencies have a regional Floodplain Administration Office that utilizes FEMA

regulations as a baseline set of criteria and has added a number of other restrictions. The end result is a policy that seeks to reduce the damages and destruction that a flood can cause.

All activity in the floodplain is controlled by the Floodplain Administration Office, which is part of the Regional Building Department. The Floodplain Administration Office works with the Corps of Engineers with respect to permitting activities.

As regulations are improved there will be more restrictions placed on existing structures when owners want to extend their economic life, make additions or otherwise want to perform some project.

The end result of the above regulation of activity in the floodplain is that there will never be large numbers of new projects or new structures that will be placed in the floodplain. . . .If a development includes part of a floodplain that area is a "no-build" area and must be permanently restricted from any building activity.

Figure 4-25 : Floodplain Review and Permit Process

Pikes Peak Regional Building Department

FLOODPLAIN REVIEW & PERMIT PROCESS

If property is located in or near a FEMA designated floodplain:

SUBDIVISION PLAT	FLOODPLAIN ZONE	LAND REQUIREMENTS	LOMR	PLAT INFORMATION REQUIREMENTS
	A - Proposed development		LOMR prior to plat.	Show FEMA approved floodplain boundary and flood elevation.
	AE -Proposed lots in flood fringe	Floodplain permit to elevate lots; No new lots in floodplain.	LOMR prior to plat.	Show FEMA approved floodplain boundary and flood elevation.
	AE - Proposed lots in floodway	No new lots in floodplain.		Plat floodplain as a NO BUILD zone tract.
	AO - Proposed development	Fill lots.	LOMR prior to plat.	Show FEMA approved floodplain boundary and flood elevation.

SINGLE LOT	PROJECT TYPE	REQUIREMENTS	FLOODPLAIN PERMIT	ELEVATION CERTIFICATE
RESIDENTIAL	Remodel less than 50 percent	Flood proof techniques to minimize future flooding; Meet construction codes as applicable.	Required	Required
	Remodel more than 50 percent	Must meet new construction requirements.	Required	Required
	New construction	Lowest floor raised 1 foot above FEMA flood elevation; Meet all current construction code requirements.	Required	
	Exterior improvement*	Design to withstand flood or break-away. Proof of retaining system.	Required	
COMMERCIAL	Remodel less than 50 percent	Use flood proofing techniques to minimize flood impact; Meet all construction codes as applicable.	Required	Required
	Remodel more than 50 percent	Meet all current construction code requirements.	Required	Required
	New construction	Lowest floor raised 1 foot above flood elevation or flood proof; Meet all current construction code requirements.	Required	Required
	Exterior improvement*	Design to withstand flood, or design to break away in a flood event. Provide proof of retaining system.	Required	

* **Exterior improvements** include changes to property (such as fill, excavation, landscaping, retaining wall, fence) and to structures (such as roofing, siding, deck, shed, etc.)

Source: Pikes Peak Regional Building Department, www.pprbd.org, accessed on January 20, 2010.

Data Limitations

HAZUS is limited in its capabilities to census block data. This modeling software provides a less accurate estimate of the floodplain than Digital Flood Insurance Rate Maps (DFIRM) maps will, once approved by FEMA and made effective. The City of Colorado Springs will be able to revise the estimations of structures and values once the El Paso County DFIRMs become effective (estimated 2011).

4.7 Landslide

Hazard Description

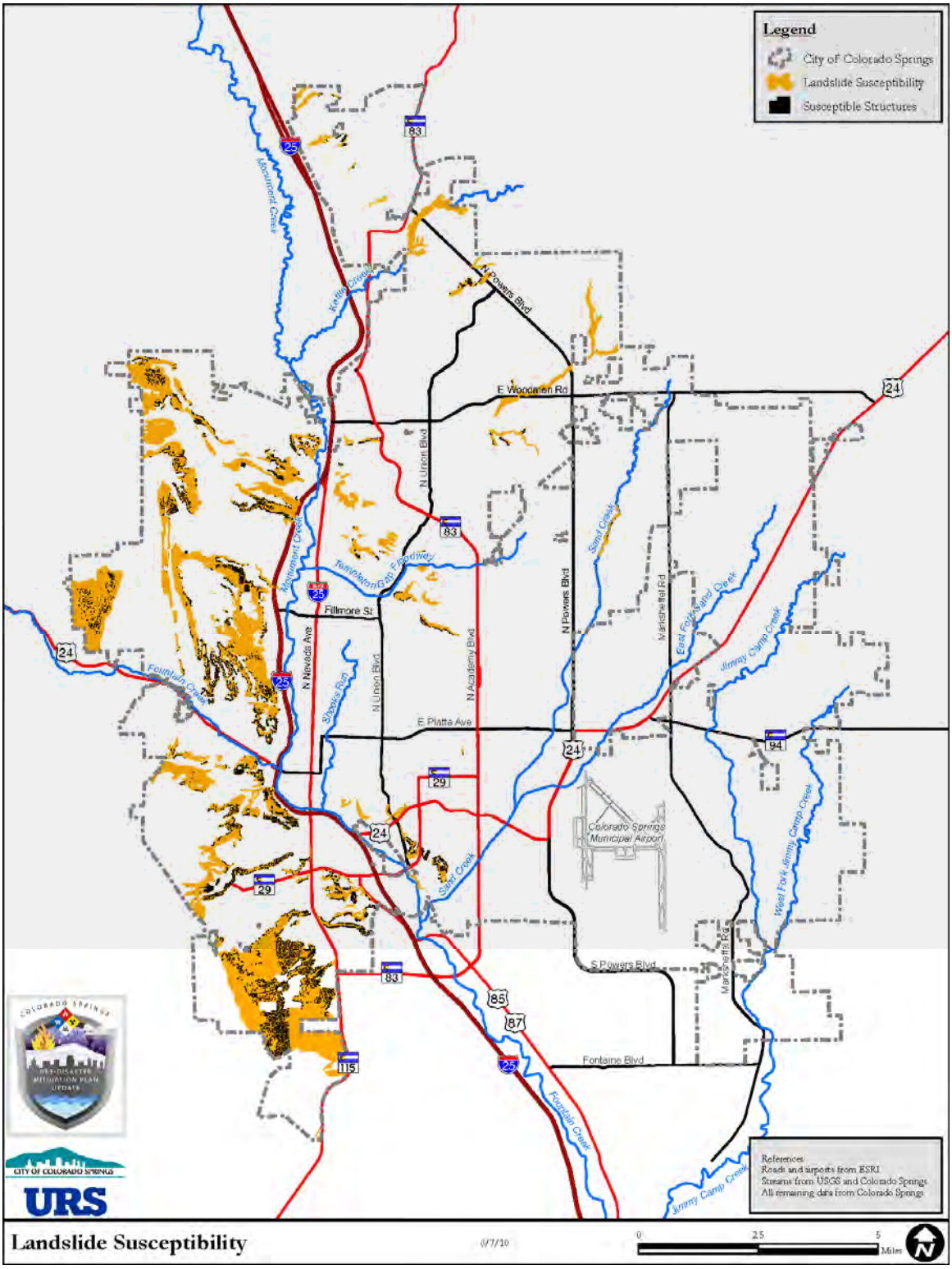
Landslides include a wide range of ground movements from rock fall to slope failure, and are primarily attributed to gravity acting on steep slopes. Landslides are a very common geological hazard throughout the nation. The United States Geological Survey (USGS) lists the following contributing factors to landslide occurrences:

- Erosion by rivers, glaciers, or ocean waves creates over-steepened slopes.
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains.
- Earthquakes create stresses that make weak slopes fail.
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides.
- Volcanic eruptions produce loose ash deposits, heavy rain, and debris flows.
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure and other structures.

Geographic Location

Landslides can occur anywhere there are unstable slopes, vulnerable underlying bedrock, or other conditions leading to slope instability. Landslides are more likely to occur on the western half of the city, near the foothills and/or other steep terrain. The following figure shows the landslide susceptibility in the City of Colorado Springs.

Figure 4-26: Landslide Susceptibility, Colorado Springs



Previous Occurrences

The following table summarizes the history of known landslide activity in Colorado Springs.

Table 4-36: Landslide History of Colorado Springs and Vicinity

Year	Description of Event	Data Source*
1959	Landslide in cut slope on Moreno Drive west of 8th Street.	John W. Himmelreich, Jr.
1961+/-	Several landslides affected I-25 south of Academy Blvd.	John W. Himmelreich, Jr.
1962	Landslide on NORAD Road west of present day Paisley Drive.	John W. Himmelreich, Jr.
1965	Road collapse due to heavy rains.	John W. Himmelreich, Jr.
1965	I-25 south of Academy, road collapse due to heavy rains.	John W. Himmelreich, Jr.
1965	August landslide impacts both northbound lanes of I-25, lanes closed.	John W. Himmelreich, Jr.
1965	Flash floods cause major landslide at Cheyenne Mountain Zoo. There were damages to the ape and hippo houses, and the Seven Falls area. Boulders dislodged from Cheyenne Mountain crossed Hwy. 115 onto Fort Carson, also blocking entrances to NORAD. Flood resulted in four fatalities and caused major destruction in currently developed areas.	2005 PDM Plan
1966+/-	Landslide to west of Garner St. mobile home park (Gold Hill Mesa area).	John W. Himmelreich, Jr.
1970	9-11" of rain cause flooding and rock slides in Rock Creek Canyon.	2005 PDM Plan
1970	21st Street drive-in area (west of 21st and north of Gold Camp Rd.).	John W. Himmelreich, Jr.
1971	South slope of Bear Creek between 8th street and I-25.	John W. Himmelreich, Jr.
1973	Enlargement/reactivation of Bear Creek slide.	John W. Himmelreich, Jr.
1976	500 block of 9th Street – landslide in cutslope.	John W. Himmelreich, Jr.
1979	Reactivation of 9th Street slide.	John W. Himmelreich, Jr.
1979	Landslide damage to 2 houses on Friendship Lane west.	John W. Himmelreich, Jr.
1980	Landslide damages 3rd house on Friendship Lane west.	John W. Himmelreich, Jr.
1980	Enlargement/reactivation of Bear Creek slide.	John W. Himmelreich, Jr.
1983+/-	Landslide damages house on Mesedge Dr. in Rockrimmon.	John W. Himmelreich, Jr.
1986	Landslide damages Rockrimmon Terrace Apartments.	John W. Himmelreich, Jr.
1993	Broadmoor South Golf Course. Forty-acre landslide disrupts golf course. Landslide enlarges to about 200 acres by 1999, damage to house and maintenance building.	John W. Himmelreich, Jr.
1994	Landslide damages Crestone Apartments above Motor City area.	John W. Himmelreich, Jr.
1994	On September 3rd, water washed rocks from a hillside onto a highway. Road was closed, and several cars were washed into the ditch.	NCDC
1995	Landslides caused by abnormal springtime rains. Slopes failed in southwest Colorado Springs, destroying 2 homes, and badly damaging 2 others.	Colorado Springs PDM Plan 2005
1995	Mesa Rd. and 30th Street. Landslide closes bike path and encroaches on road. Slide reactivated in 1997.	John W. Himmelreich, Jr.
1995	Cedar Heights "Sleeping Indian" slide. Closed main road.	John W. Himmelreich, Jr.
1995	Landslide at Cheyenne Mountain Zoo, damages access road.	John W. Himmelreich, Jr.
1995-1997	Four landslides along 30th Street. One of them closed 30th Street.	John W. Himmelreich, Jr.
1997	Landslide on slopes behind UCCS dorms. No damage to dorms.	John W. Himmelreich, Jr.
1997	Friendship Lane landslide causes severe damage to backyard, threatening home stability.	John W. Himmelreich, Jr.
1997	Landslide on slope behind ENPAC Building, threatening a city water line.	John W. Himmelreich, Jr.
1997	Landslide in Cedar Heights (Old Scotchman Way) partially blocks road and threatens home.	John W. Himmelreich, Jr.

Year	Description of Event	Data Source*
1997	Landslide on slope on north side of Pinecliff area. Threatens houses above and below.	John W. Himmelreich, Jr.
1998	Rockrimmon Blvd. landslide at the Ridge Apartments destroys sidewalk and partially blocks road. Threatens apartment building.	John W. Himmelreich, Jr.
1999	Heavy rains caused tens of millions in damages from landslides. Following this event, the City with help from FEMA purchased 25 homes damaged by landslides and razed them.	PERI/CGS/2005 PDM Plan
1999	Landslides damage Fountain Valley Pipeline south of Academy and west of I-25. $7 million to relocate pipeline and repair slope.	John W. Himmelreich, Jr.
1999	Numerous landslides on west side of Colorado Springs from Peregrine to Broadmoor Bluffs.	John W. Himmelreich, Jr.
2009	May 22nd, heavy rains brought flash flooding to South Cheyenne Canyon causing mud and rock slides and flooding of a road.	NCDC

* Event history provided by John W. Himmelreich, Jr. included his personal observations, photos, newspaper articles, air photos, consultant reports, and personal communications that he had collected over the years.

Probability of Future Occurrence

Likely: *10-100 percent chance of occurrence next year or it has a recurrence interval of 10 years or less*

Historical data would suggest that a major landslide event would occur within the city once every 1.4 years. There were at least 37 events over a 50-year period, thus the probability is 74% that an event would occur any given year. However, it should be recognized that historical evidence may not be adequate for determining the likelihood of such an event. The City of Colorado Springs has completed several programs for mitigation of landslides; therefore the likelihood is decreased that an event would occur or result in the historical damages listed in Table 4-36: Landslide History of Colorado Springs and Vicinity.

The following excerpt is from the 2005 Plan:

There is no precise or accurate way to predict what other slopes may fail in the future or to what extent slope failures may continue to be a problem. The extent of future damage can be from light or minimal damage to total destruction of structures.

A worse case scenario could develop for subsequent landslides in the future if several prolonged low intensity saturating rainstorms (e.g. where it drizzles for 4 or more days continuously per storm) occur over a few months. Under these conditions slope failures may begin to develop. Depending on the condition of the underlying material some of this moisture may be able to penetrate quickly to reach material that is susceptible to failure. At other locations it may take quite a bit of time for the moisture to reach a potential weak layer or zone.

Landslides that have already occurred could be reactivated by excess moisture conditions.

Figure 4-27: Landslide on Friendship Lane, 1997

Source: Photo by John W. Himmelreich, Jr., Provided by email February 26, 2010.

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*

Landslides and slope failures in the past have caused major structural damages 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. 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.

Vulnerability Assessment

Overall Summary and Impacts: The general assessment for where landslides may occur within the Colorado Springs vicinity 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. Based on the overall susceptibility research conducted by the Colorado Geological Survey, the bulk of the landslide/rockfall vulnerability is in the western half of the city, where the topography is mountainous and soils are less stable.

Identifying Structures and Estimating Potential Losses: There are 8,103 structures within the identified landslide susceptibility areas defined in the Colorado Geological Survey's *Map of Potential Areas of Landslide Susceptibility in Colorado*

Springs, El Paso County, Colorado 2003. This equates to 4.4% of the total buildings in the City of Colorado Springs. There are 2,899 structures located within historic landslide areas defined by a consultant through previous study, identified by remote sensing and/or other means, or published documented landslides in geological studies. These structures are shown in Figure 4-28.

There are 359 structures that are within the rockfall susceptibility zone, according to GIS data provided by the Colorado Geological Survey from the *Rockfall Hazard Susceptibility in Colorado Springs, El Paso County, Colorado 2006*. Figure 4-29 illustrates the location of those structures related to the City of Colorado Springs as a whole.

Figure 4-28: Documented Historic Landslide Susceptibility

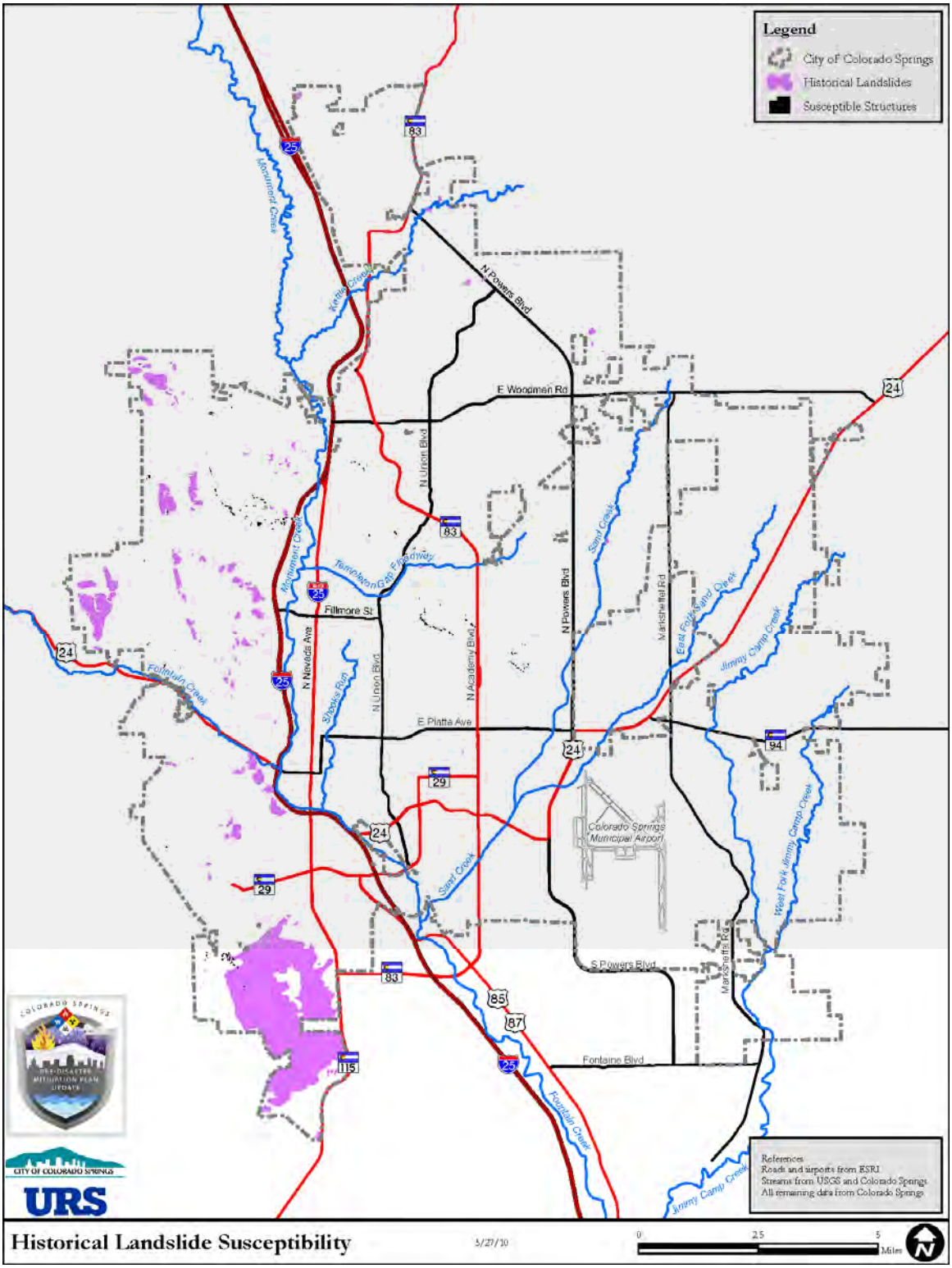
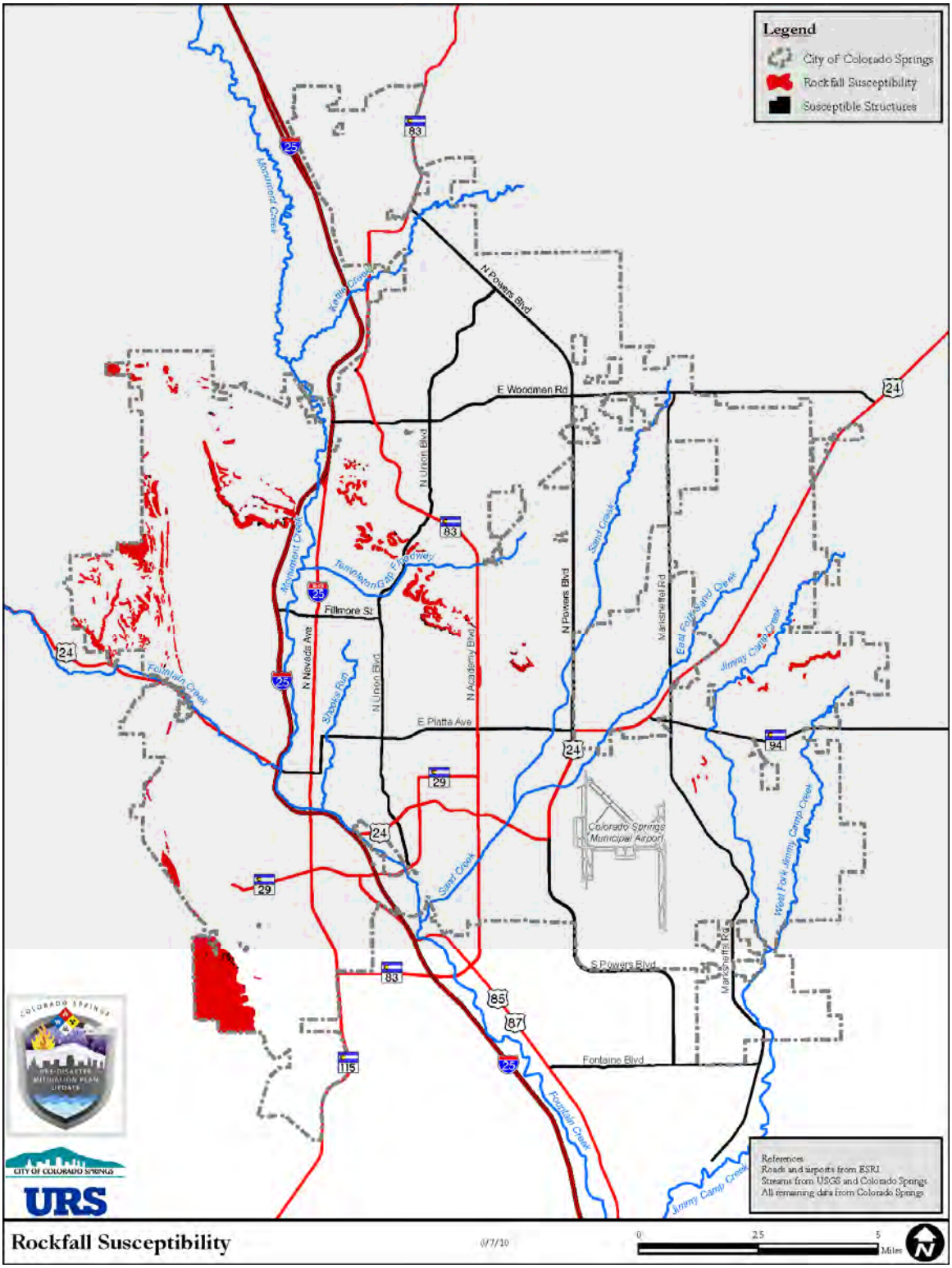


Figure 4-29: Rockfall Susceptibility



Subsidence is defined by the Colorado Geological Survey as the sinking of the land over man-made or natural underground voids.[13] Subsidence can occur over a prolonged period of time, or abruptly in the form of sinkholes. Like landslides, subsidence can cause major damages to structures and other infrastructure as the land moves and gives way.

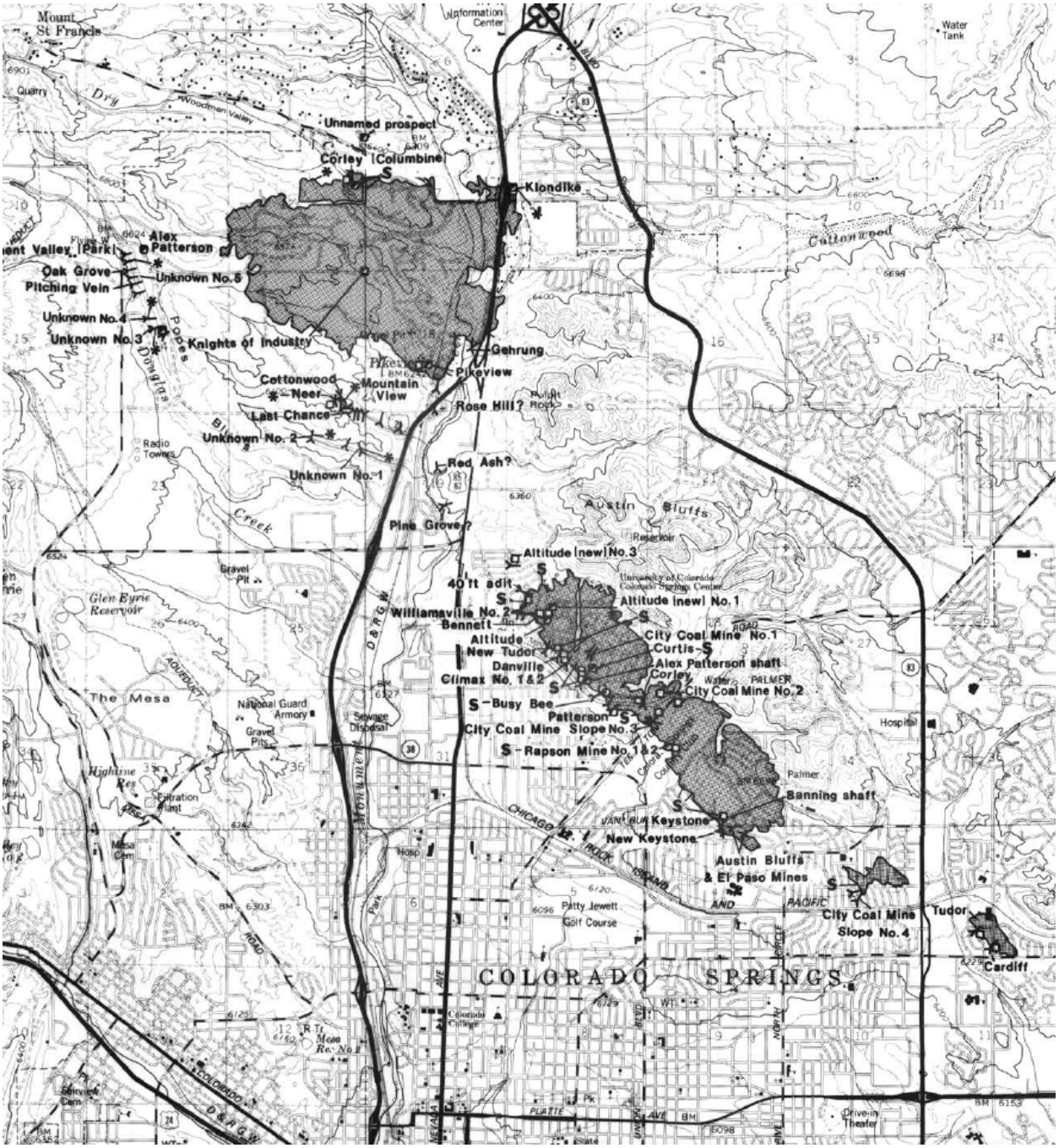
Figure 4-30: Mine Subsidence Pit on Vacant Lot, Cragmor Subdivision Area, 1996

Source: Photo by John W. Himmelreich, Jr., Provided by email February 26, 2010.

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.[14] Figure 4-31, below, shows the undermined areas in Colorado Springs.

[13] Colorado Geological Survey, http://geosurvey.state.co.us/Default.aspx?tabid=358, accessed on January 26, 2010.
[14] As identified in the Dames and Moore Study, *Colorado Springs Subsidence Investigation*, 1985.

Figure 4-31: Undermined Areas within the City of Colorado Springs



Source: Colorado Geological Survey, Mine Subsidence Information Center, http://geosurvey.state.co.us/portals/0/El%20Paso%20County.pdf.

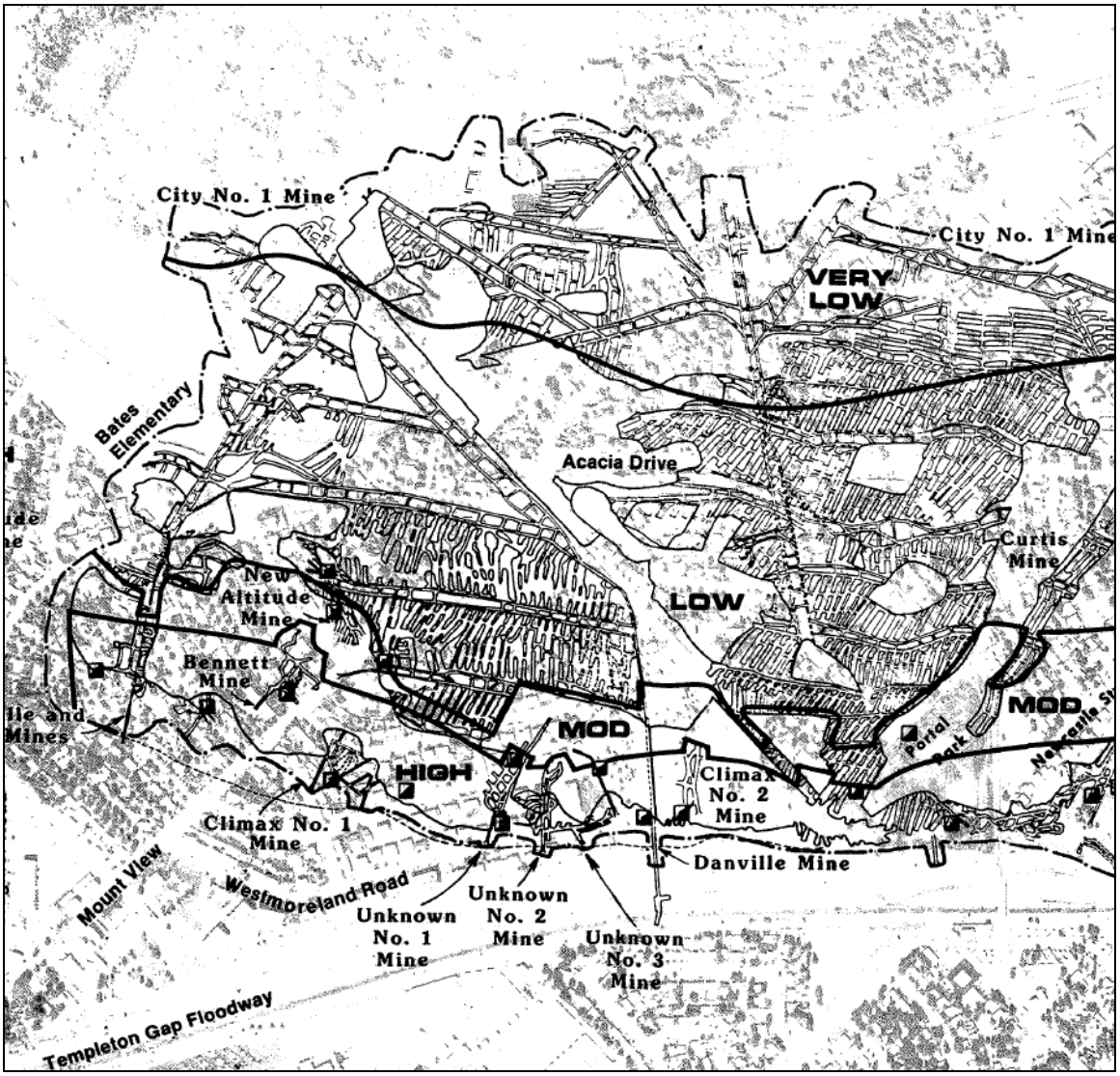
In a study conducted by Dames and Moore in 1985, *The Colorado Springs Subsidence Investigation,* it was determined that the highest hazards for subsidence occurred in the Cragmor/Country Club Area, Palmer Park, and Rustic Hills, over areas where room and pillar and extraction techniques were utilized by previous mining activity. The probabilities were noted as follows:

Table 4-37: 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

Source: *Colorado Springs Subsidence Investigation*, Dames & Moore 1985.

Figure 4-32: Example Map from Dames & Moore Study



Source: *Colorado Springs Subsidence Investigation*, Dames & Moore 1985, Map Plate 3.

Table 4-38: Subsidence History of Colorado Springs and Vicinity

Year	Description of Event	Data Source
1979	Massive sinkhole 20-25 feet around an abandoned shaft of the Klondike Mine opened up near I-25 and Woodmen Road.	Colorado Geological Survey
2005	Subsidence in Country Club neighborhood during concrete pumping activities to fill abandoned mine shafts.	http://www.gazette.com/articles/mine-17082-amundson-house.html
2009	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.	http://www.kktv.com/community/headlines/79872332.html

Future Development: 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 the subsurface water levels. This has resulted in marginally stable slopes becoming even less stable, and more sensitive to significant precipitation events.[15]

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 affects of landslides on development. In addition, 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.

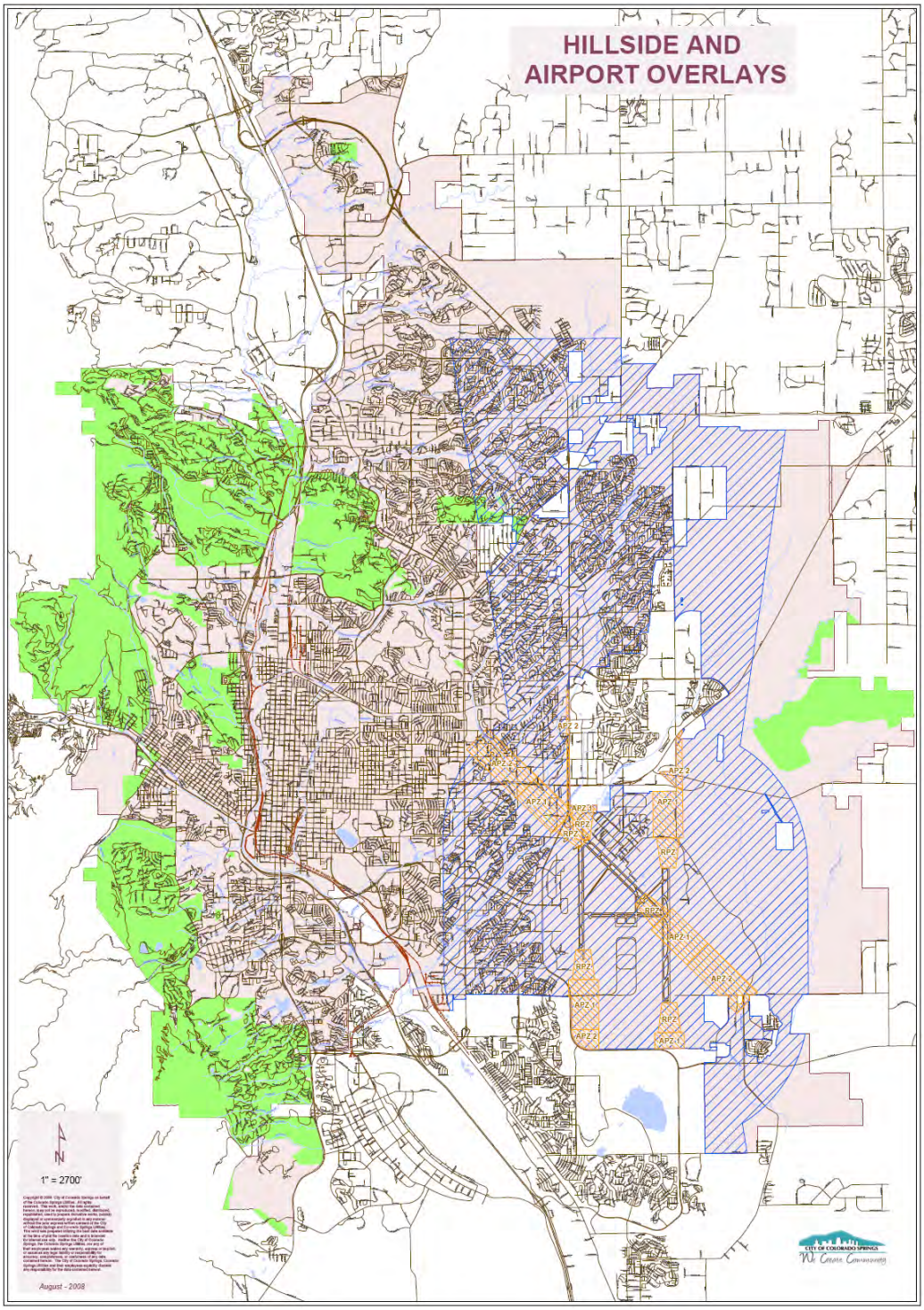
The Hillside Area Overlay was created by the City of Colorado Springs not only to protect the public health, welfare, and safety, but also to protect and complement the natural environment. Figure 4-33 is a map of the Hillside Area Overlay (and airport overlays). The areas in green are in the Hillside Area Overlay.

Data Limitations

The prediction of slope failures is difficult to achieve. Often slopes that were considered stable may fail under ideal conditions including but not limited to prolonged periods of rain and/or extensive cut and fill. Regional assessment of the risk to landslides is available; however this information is not accurate to the individual parcel. Geotechnical studies must be prepared in order to determine a particular lot's vulnerability to slope failure. For subsidence, the Colorado Geological Survey Mine Subsidence Information Center is currently preparing a geo-coded dataset that identifies previous occurrences and locations of mine subsidence. This data should be available for release in summer 2010. The next update of this PDMP should incorporate that data.

[15] Colorado Landslide Mitigation Plan – Landslide Update, www.dola.state.co.us/dem/mitigation/landslideupdate.pdf, accessed November 10, 2009.

Figure 4-33: Hillside Area Overlay for the City of Colorado Springs



Source: City of Colorado Springs, http://www.springsgov.com/Page.aspx?NavID=1040, accessed on December 3, 2009.

4.8 Hail

Hazard Description

Hail is associated with thunderstorms that can also bring high winds and tornadoes. It forms when updrafts carry raindrops into extremely cold areas of the atmosphere where they freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. Hailstorms cause damage to structures and other types of property, as well as crops and livestock, and in rare cases to humans.

Geographic Location

Hailstorms can occur anywhere in Colorado Springs with equal probability and magnitude.

Figure 4-34: Hail Storm Developing over the Air Force Academy, August 10, 2004

Source: NOAA Photo Library, http://www.photolib.noaa.gov/700s/wea02264.jpg, accessed on December 4, 2009.

Previous Occurrences

There were over 830 records of significant hail storms in El Paso County from 1955 to 2009. Some of the larger noted storms are listed below. One particular storm caused over $8.7 million in damages in Colorado Springs when large hail damaged 3,000 homes and 1,800 automobiles. It is not uncommon for storms in El Paso County to produce hailstones over two inches in diameter.

Table 4-39: Partial list of Significant El Paso County, Colorado Hail Events

Date	Diameter	Injuries*	Fatalities*	Property Damages ($)*	Crop Damages ($)*	Source
5/12/1961				1,923.08	0	SHELDUS
6/2/1961				1,851.85	18,518.52	SHELDUS
6/3/1961	1.00			25,000	0	SHELDUS/NCDC
7/1/1961				1,562.5	15,625	SHELDUS
5/17/1962	0.75			333.33	333.33	SHELDUS/NCDC
7/28/1962				0	5,000	SHELDUS
7/27/1963	1.00			500	0	SHELDUS/NCDC
5/29/1964				192	1,923	SHELDUS
8/4/1964	1.75			500,000	0	SHELDUS/NCDC
6/14/1965	1.00	1		5,000	0	SHELDUS/NCDC
6/17/1965	1.00			500,000	0	SHELDUS/NCDC
8/21/1965				16,667	0	SHELDUS
7/21/1966				172	0	SHELDUS
7/11/1967				50,000	0	SHELDUS
5/31/1968	1.25			1,667	0	SHELDUS/NCDC
7/24/1970	0.75		1	50,000	0	SHELDUS/NCDC
7/8/1971	0.75			5,000	0	SHELDUS/NCDC
7/18/1972	0.75			50,000	0	SHELDUS/NCDC
7/20/1973	0.75			166,667	16,667	SHELDUS/NCDC
7/22/1974	1.00	1		2,500	0	SHELDUS/NCDC
8/14/1977	1.50			50,000	0	SHELDUS/NCDC
7/9/1978	2.00			5,000,000	0	SHELDUS/NCDC
6/19/1980	2.00			17	16,667	SHELDUS/NCDC
6/12/1982	2.50	2		5,000,000	5,000	SHELDUS/NCDC
6/9/1985	1.75			50,000	0	SHELDUS/NCDC
7/9/1988	1.00			50,000	0	SHELDUS/NCDC
8/9/1988	1.75			500,000	0	SHELDUS/NCDC
6/20/1992	2.00			100,000	0	SHELDUS/NCDC
6/26/1992	2.00			11,000,000	0	SHELDUS/NCDC
7/23/1996	2.75	2		300,000	0	SHELDUS/NCDC
7/24/1996	0.75			8,700,000	0	SHELDUS/NCDC
6/20/2001	4.00			2,000,000	0	SHELDUS
6/14/2002	1.00			24,000,000	0	SHELDUS/NCDC/2005 PDM Plan
7/9/2004	2.00					NCDC
8/10/2004	1.75					NCDC
8/23/2007	1.25			significant		NCDC

* Data from SHELDUS are by county, therefore exact location is unknown. Some records may not be applicable to Colorado Springs specifically. Within the SHELDUS database, Damages, Injuries, and Fatalities for any one documented disaster are divided between the affected counties.

Probability of Future Occurrence

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

According to the historical data available, it is likely that a major hail event will occur every year. There were 830 major events on record in El Paso County since 1955, which carried forward equates to over 15 major events per year. Although not all recorded hailstorms affected Colorado Springs directly, one can infer that at least one major hailstorm will impact Colorado Springs annually.

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 hour*

Large hailstones are capable of damaging structures, automobiles, and harming individuals and livestock. Table 4-40, below, documents the typical damages associated with the various intensity categories of hailstones.

Table 4-40: 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
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.

Vulnerability Assessment

Vulnerability Summary: The City of Colorado Springs 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 Colorado Springs, and it is reasonable to expect future damages to automobiles, structures, and potentially individuals.

Identifying Structures and Estimating Potential Losses: Hail affects the entire planning area, including all above-ground structures and utilities. Structure damage due to hail is typically covered under private insurance. Personal injury can also occur as a result of hail if individuals are outdoors during an event. Large hailstorms can result in localized flooding when the hailstones form dams in stormwater drainage ways. These secondary affects of hail are difficult to predict or prevent but can cause significant damages to structures.

Future Development: Building standards can offer only limited protection from hail damage. Increasing population growth and development increases vulnerability to major hailstorms. The City of Colorado Springs requires a Class A roof on all new residential structures by ordinance, which should effectively reduce the amount of hail damages.

Data Limitations: Many hail-producing storms go unreported to the National Weather Service. Therefore, data collected for the purposes of this study may not be all-inclusive of major hail events experienced in El Paso County or the City of Colorado Springs.

4.9 Tornado

Hazard Description

The National Weather Service defines a tornado as a "violently rotating column of air extending from a thunderstorm to the ground." Tornadoes are the most violent of all atmospheric storms. Wind speeds can exceed 250 miles per hour, and damage paths can be more than one mile wide and 50 miles long. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) Scale. An updated and revised version of the Fujita scale is the Enhanced Fujita Scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado.

Table 4-41: Tornado Intensity Scales

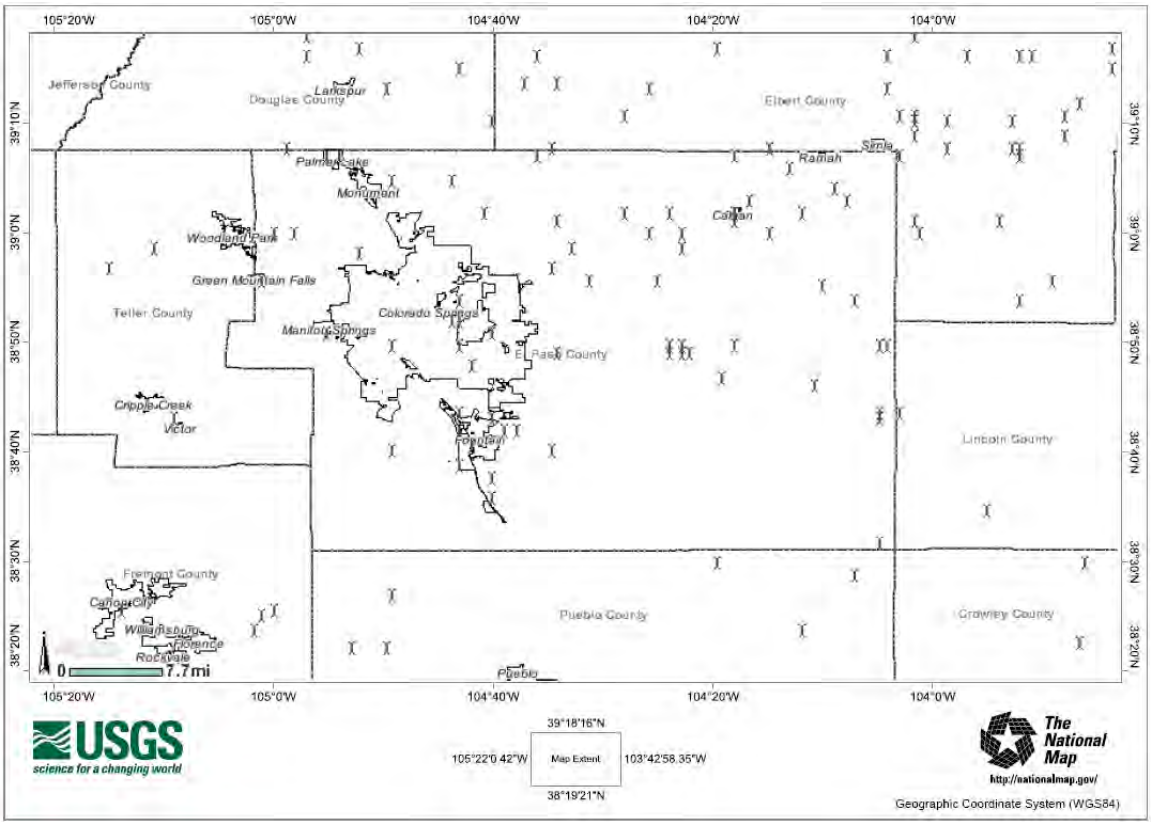
Intensity Category (F-Scale)	Wind Estimate (3 Second Gust)	Intensity Category (Operational EF-Scale)	Wind Estimate (3 Second Gust)	Typical Damage Impacts
F0	45-78 mph	EF0	65-85 mph	**Light damage:** Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	79-117 mph	EF1	86-110 mph	**Moderate damage:** Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	118-161 mph	EF2	111-135 mph	**Considerable damage:** Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	162-209 mph	EF3	136-165 mph	**Severe damage:** Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	210-261 mph	EF4	166-200 mph	**Devastating damage:** Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	262-317 mph	EF5	Over 200 mph	**Incredible damage:** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

Source: NOAA Storm Prediction Center at http://www.spc.noaa.gov/faq/tornado/ef-scale.html and http://www.spc.noaa.gov/faq/tornado/f-scale.html, accessed 23 October 2009.

Geographic Location

Tornadoes can occur anywhere in Colorado Springs and pose a similar risk to all areas within the city. The following map, Figure 4-35, shows recorded tornadoes from 1954-2004 from the USGS National Map Viewer. It is readily apparent that multiple tornadoes are recorded within the City limits of Colorado Springs.

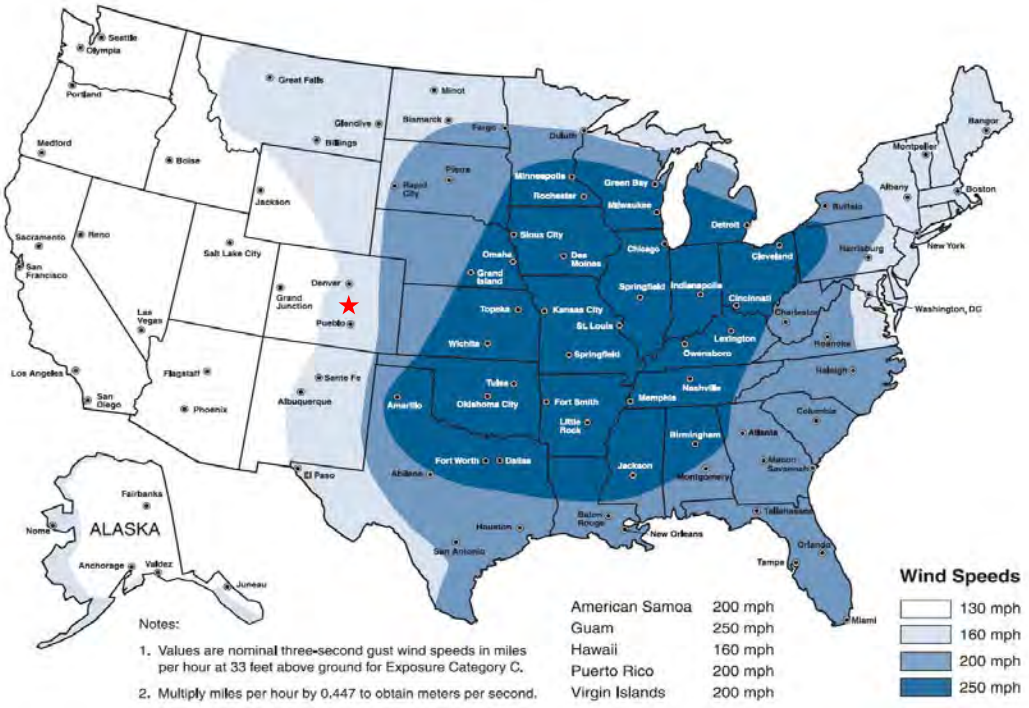
Figure 4-35: Tornadoes in Colorado Springs, El Paso County, 1954-2004



Source: USGS National Map Viewer, http://nmviewogc.cr.usgs.gov/viewer.htm accessed on February 4, 2010.

FEMA's map of Wind Zones in the United States shows Colorado Springs located in Wind Zone II with tornado winds of up to 160 mph. The following figure illustrates the Tornado Safe Room Design Speeds for the nation.

Figure 4-36: Tornado Safe Room Design Wind Speed Map



Source: http://www.fema.gov/plan/prevent/saferoom/fema361.shtm, accessed on November 15, 2009.

Previous Occurrences

There were 80 Tornadoes reported in El Paso County between 1950 and 2008. Table 4-42 is a list of some known Tornadoes that either caused property damages or injuries/fatalities.

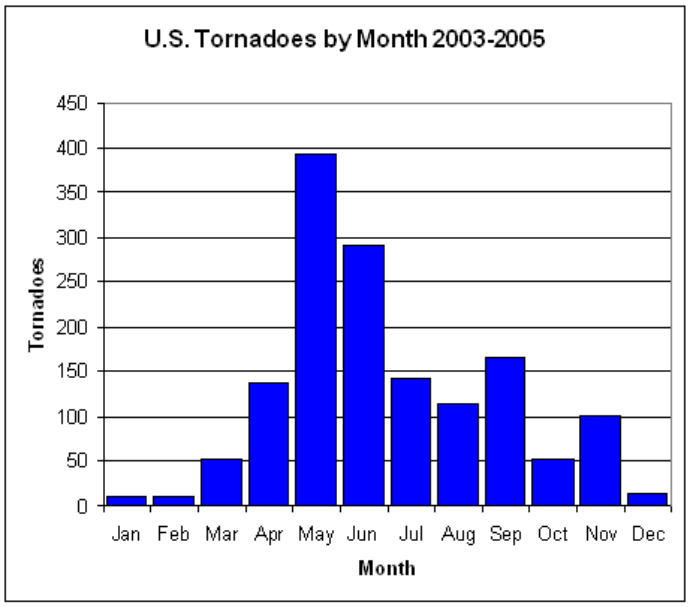
Table 4-42: Partial List of Tornadoes in Colorado Springs and El Paso County

Date	Magnitude (Fujita Scale)	Injuries*	Fatalities*	Property Damages ($)*	Source
6/14/1951	F1			2,500	NCDC
6/2/1961				1,923	SHELDUS
6/22/1962				2	SHELDUS
6/17/1965				500	SHELDUS
5/28/1972				50	SHELDUS
4/11/1977	F2			250,000	SHELDUS/NCDC
6/13/1977	F2	2		250,000	SHELDUS/NCDC
6/24/1979	F3	1		250,000	SHELDUS/NCDC
6/9/1985	F1			25,000	NCDC
6/6/1990	F2	2		250,000	SHELDUS/NCDC
6/22/1995	F1			200,000	SHELDUS/NCDC
8/4/1995**	F0				NCDC
7/3/1998**	F0				NCDC
5/25/2000				5,000	SHELDUS
7/20/2000**	F0				NCDC
5/28/2001	F2	4		8,000,000	SHELDUS/NCDC
5/28/2001	F1	5		100,000	SHELDUS
5/28/2001	F2	4		20,000	SHELDUS
8/13/2008	F1			10,000	SHELDUS/NCDC

* Data from SHELDUS are by county, therefore exact location is unknown. Some records may not be applicable to Colorado Springs specifically. Within the SHELDUS database, Damages, Injuries, and Fatalities for any one documented disaster are divided between the affected counties.
** Data shows that tornado occurred in the City of Colorado Springs.

Figure 4-37, below, shows the number of tornadoes by month in the United States. Most tornadoes in the U.S. occur in the months of May and June. This is apparent in the Colorado Springs vicinity as well.

Figure 4-37: U.S. Tornadoes by Month 2003-2005



Source: National Climatic Data Center, online at http://www.ncdc.noaa.gov/oa/climate/severeweather/tornadoes.html#timing, accessed on February 2, 2010.

Probability of Future Occurrence

Likely: *10-100 percent chance of occurrence next year or it has a recurrence interval of 10 years or less*

Based on the data available, a tornado occurring in El Paso County is highly likely every year. There were at least three tornadoes that touched down in Colorado Springs within the past 15 years. When extrapolated, one could assume that a tornado is expected to occur within Colorado Springs once every five years, or there is a 20% chance of a tornado occurring any given year.

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*

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 damages could be devastating.

Vulnerability Assessment

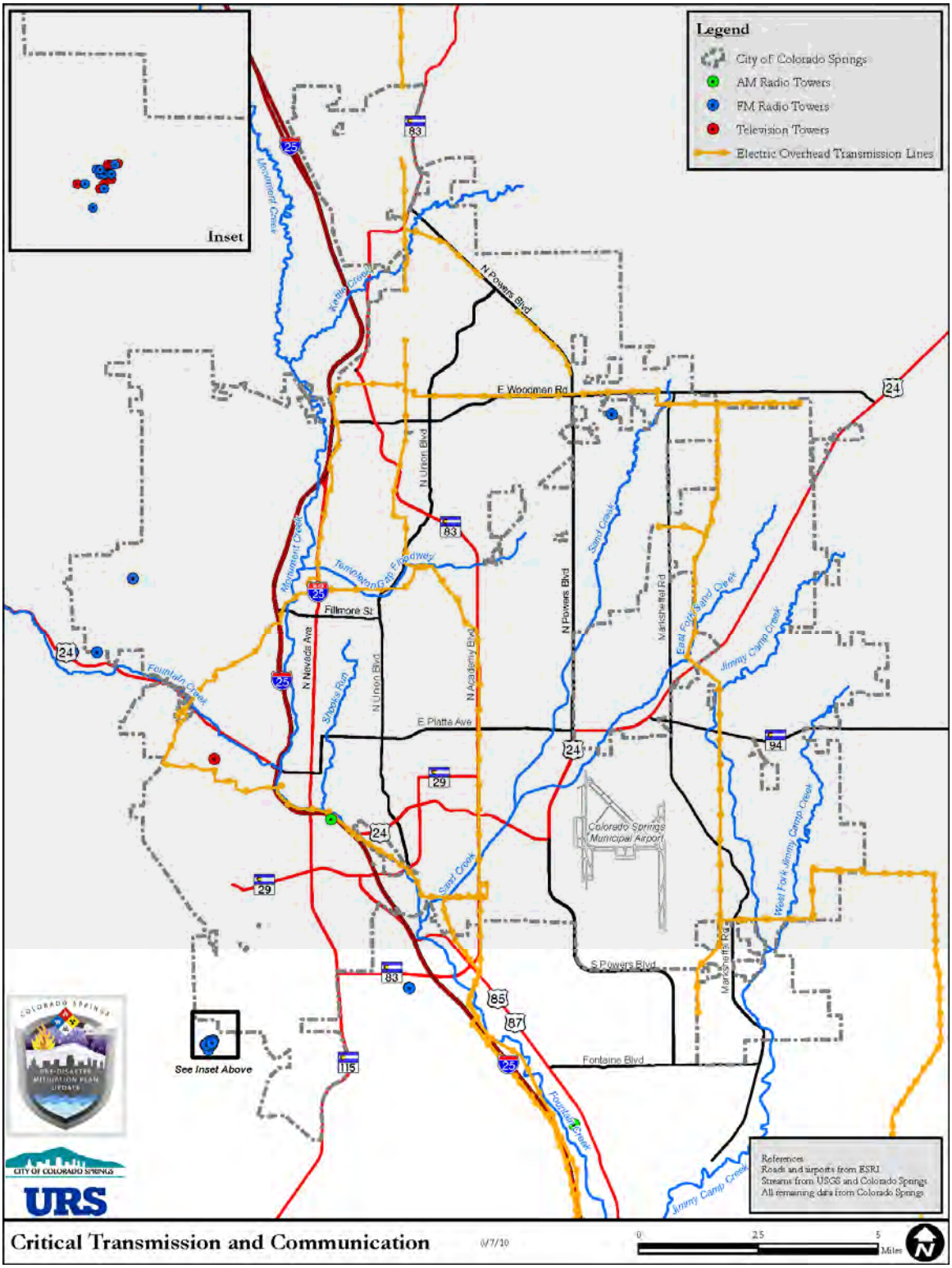
Overall Summary and Impacts: There are several significant tornadoes that have caused injuries and property damages in El Paso County in the past. It can be expected that history will repeat itself, and major tornadic events will continue to occur not

only within the county, but within the City of Colorado Springs. Knowing exactly where, or how severe, is impossible to determine.

Identifying Structures and Estimating Potential Losses: Tornadoes can cause significant damage to structures, trees, utilities, crops, and have the potential to injure and kill people. 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 are no specific identified hazard areas as the entire city is susceptible to tornadoes. With advance warning, people can evacuate to saferooms, or to more structurally sound areas within the building. Basements are considered one of the safest places to seek shelter during a tornadic event.

Within five miles of the City of Colorado Springs, there are 32 FCC FM towers, 28 FCC TV towers, and three FCC AM towers. These are utilities that could potentially be damaged or destroyed in a path of a tornado. In addition, there are roughly 110 miles of overhead transmission lines within the City of Colorado Springs. The possible destruction of these utilities, shown in Figure 4-38, can decrease the effectiveness of the community's ability to respond to emergencies.

Figure 4-38: Above-Ground Utilities (Critical Transmission and Communication)



Also vulnerable are mobile home parks, where the lack of a sound foundation often results in complete devastation of these structures as they are whisked away by even the low-intensity tornadoes. Figure 4-40 shows the mobile home parks (953 acres) within the City of Colorado Springs.

Areas with large amounts of trees present additional vulnerability, as large trees can be uprooted and their limbs projected great distances. Figure 4-41 shows the areas in the City of Colorado Springs where tree densities are highest, and shows the locations of structures in those areas.

Figure 4-39: Tornado near Colorado Springs, ca. 1920s

Source: Pikes Peak Library District Special Collections Photo Archive, http://library.ppld.org/SpecialCollections/Project/Search.aspx?JFile=013-144-di-72.jpg;&view=1, accessed on November 30, 2009.

Figure 4-40: Mobile Home Parks in Colorado Springs

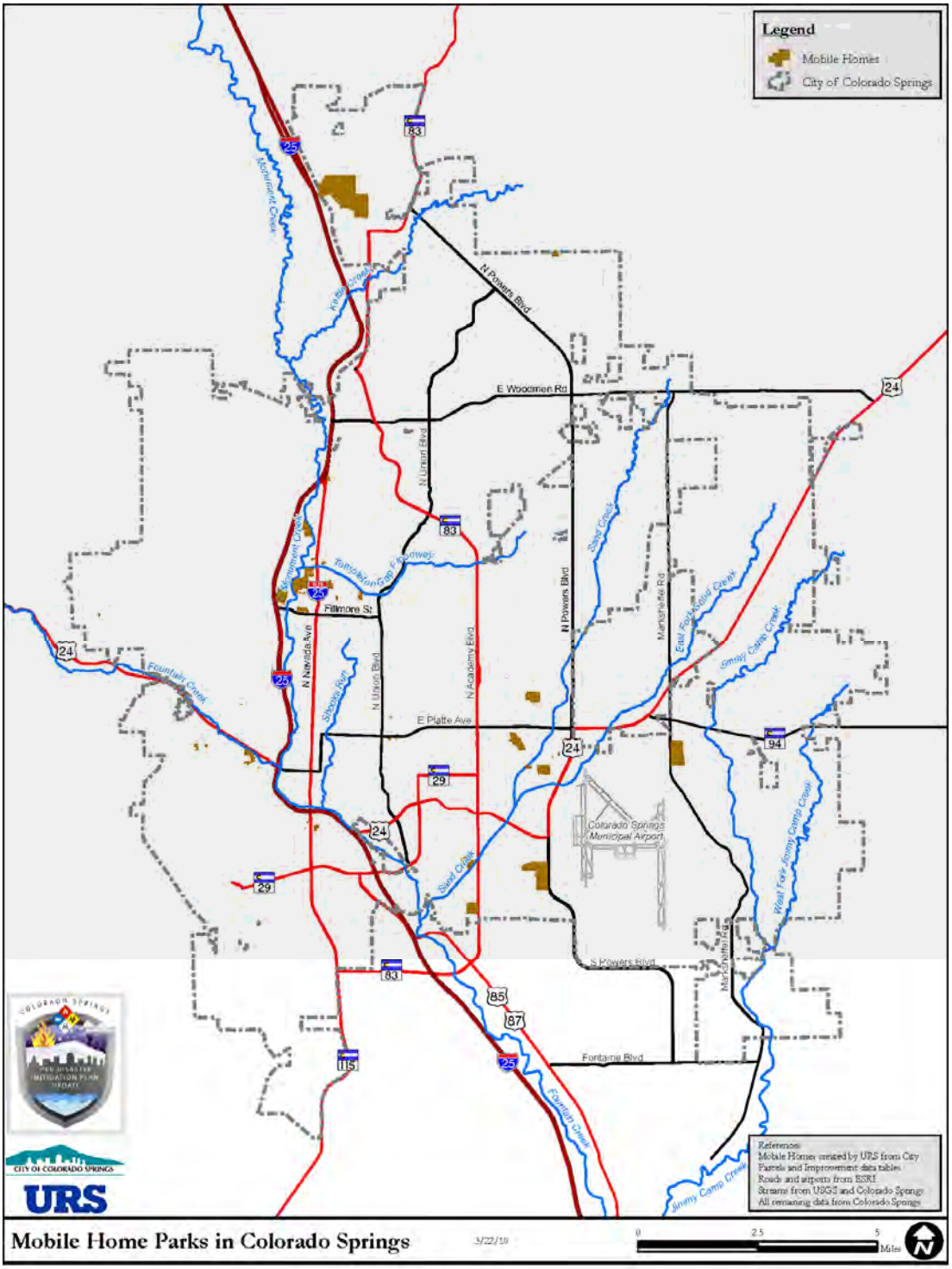
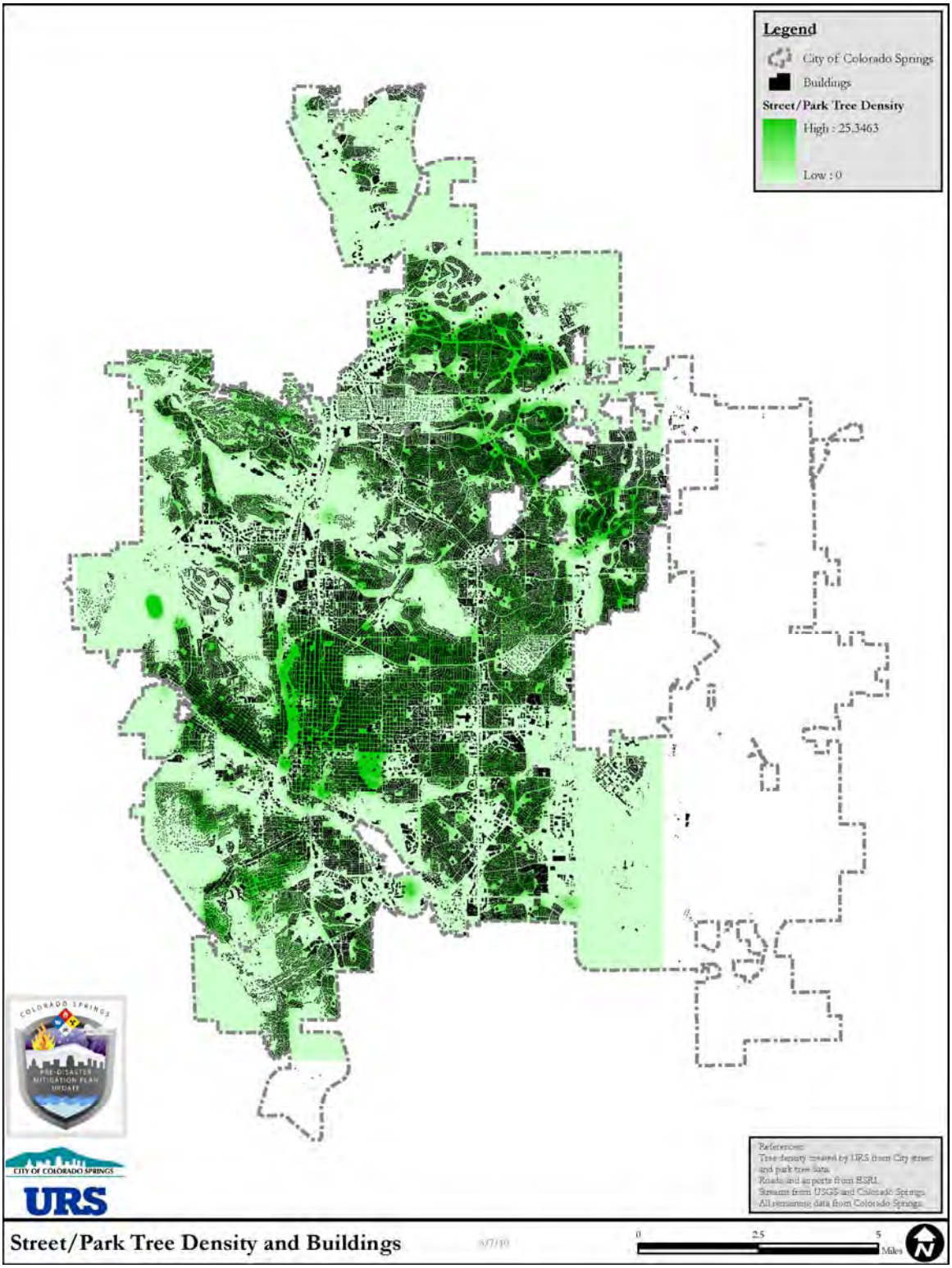


Figure 4-41: Tree Density in Colorado Springs



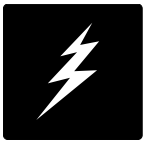
Future Development: Continuing development pressures along the Front Range will likely increase the overall vulnerability to Tornadoes. Building codes in place can reduce the overall impacts; however significant tornadoes are unpredictable and are capable of destroying buildings with incredible structural integrity. As the city grows, development to the east will be particularly more vulnerable to tornadoes, as most of the tornadoes recorded in the county occurred further away from the foothills.

Data Limitations

Due to the isolated nature of tornadic storms, it is difficult to determine the vulnerability of specific areas. Tornado data is often collected by observations and many events are not reported to the National Weather Service or other archiving agencies.

4.10 Lightning

Hazard Description



Lightning is an electrical discharge between positive and negative regions of a thunderstorm. It is sudden, extremely destructive and potentially deadly. Intracloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and from the outside of the cloud looks like a diffuse brightening that flickers. Although not as common, cloud-to-ground lightning is the most damaging and dangerous form of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat. Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

Geographic Location

Lightning can occur anywhere in Colorado Springs, and poses a similar risk to all areas within the city.

Previous Occurrences

There were over 50 significant lightning events on record for Colorado Springs and the vicinity since 1960. The National Climatic Data Center (NCDC) listed 21 major lightning events as occurring in Colorado Springs since 1996. One particularly damaging event occurred on August 29, 1996 when a lightning strike ignited an attic fire in an historic parish house at First Lutheran Church. This event caused roughly $200,000 in damages. More recently, in July 2007 a lightning-ignited house fire in the Woodmen Subdivision caused over $30,000 in damages.

Table 4-43: Partial List of Significant Lightning Events in El Paso County, Colorado

Date	Injuries*	Fatalities*	Property Damages ($)*	Source**
9/7/1960	1		50	SHELDUS
5/12/1962			172	SHELDUS
5/26/1962			50,000	SHELDUS
7/18/1962			25	SHELDUS
6/14/1963	0.67		1,667	SHELDUS
8/6/1963	0.07		172	SHELDUS
7/7/1964	1		0	SHELDUS
8/5/1964	1.1		0	SHELDUS
8/16/1972	1	2	0	SHELDUS
8/28/1973	1		0	SHELDUS
6/1/1974	1		0	SHELDUS
6/27/1974	2		0	SHELDUS
6/7/1975	1		0	SHELDUS
7/27/1977		1	0	SHELDUS
7/2/1980			50,000	SHELDUS
8/9/1982		1	0	SHELDUS
5/18/1985		1	0	SHELDUS
3/5/1990			166,667	SHELDUS
6/2/1995	1		0	SHELDUS
7/1/1995	1	1	0	SHELDUS
7/9/1995	1	1	0	SHELDUS
6/12/1996			70,000	SHELDUS
7/10/1996	1		0	SHELDUS/NCDC
7/20/1996		1	0	SHELDUS/NCDC
8/29/1996			200,000	SHELDUS/NCDC
9/10/1996	1		0	SHELDUS/NCDC
6/6/1997	1		0	SHELDUS/NCDC
7/6/1997		1	0	SHELDUS
7/6/1998			50,000	SHELDUS/NCDC
7/10/1998			85,000	SHELDUS/NCDC
8/19/1998	1		0	SHELDUS
5/24/1999	4		0	SHELDUS/NCDC
8/19/1999	8		0	SHELDUS/NCDC
7/20/2000			5,000	SHELDUS
7/25/2000		1	0	SHELDUS/NCDC
7/28/2000	1		0	SHELDUS
8/2/2000			75,000	SHELDUS/NCDC
5/30/2001	3	1	0	SHELDUS
7/12/2001			20,000	SHELDUS/NCDC
7/13/2001			100,000	SHELDUS/NCDC
8/5/2001	1		0	SHELDUS/NCDC

Date	Injuries*	Fatalities*	Property Damages ($)*	Source**
7/13/2003	1		0	SHELDUS
7/25/2003	1		0	SHELDUS
8/5/2003		1	0	SHELDUS
8/23/2003	3		0	SHELDUS/NCDC
6/26/2004			3,000	SHELDUS
7/19/2006	1		0	SHELDUS/NCDC
5/22/2007	1		0	SHELDUS/NCDC
6/2/2007	1		0	SHELDUS
6/4/2007			3,000	SHELDUS/NCDC
7/10/2007			30,000	SHELDUS/NCDC
9/2/2007	3		0	SHELDUS/NCDC
6/24/2008	2		0	SHELDUS/NCDC

* Data from SHELDUS are by county, therefore exact location is unknown. Some records may not be applicable to Colorado Springs specifically. Within the SHELDUS database, Damages, Injuries, and Fatalities for any one documented disaster are divided between the affected counties.
** Data from NCDC listed event as Colorado Springs for location identification.

In addition, the Colorado Springs Fire Department tracks dispatch data regarding all of their responses. Table 4-44, below, contains the number of incidents that CSFD responded to that were dispatched as lightning strikes.

Table 4-44: Dispatched Lightning Strike Responses, CSFD 1993-2009

Year	Number of Lightning Strike Dispatches	Year	Number of Lightning Strike Dispatches
1993	33	2002	23
1994	70	2003	21
1995	45	2004	48
1996	56	2005	22
1997	34	2006	66
1998	46	2007	44
1999	59	2008	4
2000	67	2009	36
2001	58	--	--

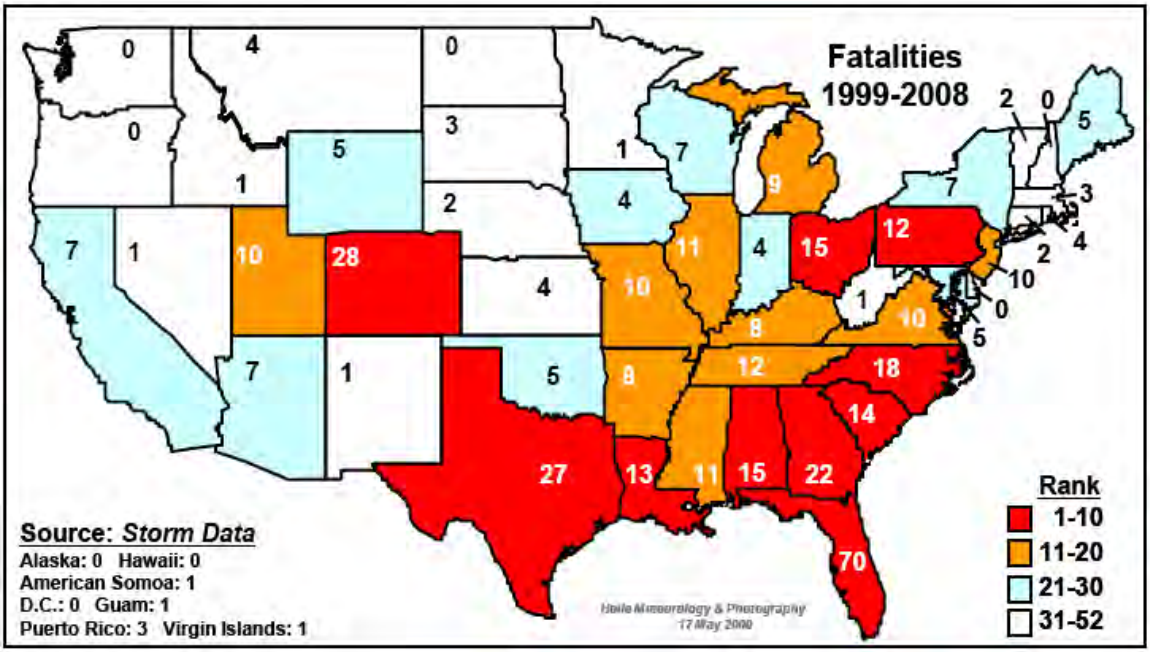
Source: Data provided by email from Bill Wallace, CSFD on January 4, 2010.

Probability of Future Occurrence

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

According to the historical data, a significant lightning event occurs within Colorado Springs nearly every year. There were 21 events recorded in 13 years in the city and 54 events recorded since 1960 in the county. Either scenario presents a probability of greater than one. The following figure illustrates the number of lightning related fatalities by state from 1999-2008. Colorado (28 fatalities) was second only to Florida, which had 70 lightning deaths.

Figure 4-42: Lightning Fatalities by State, 1999-2008



Source: NOAA's lightning safety site, http://www.lightningsafety.noaa.gov/stats/99-08_deaths_by_state.pdf, accessed on January 22, 2010.

Magnitude/Severity

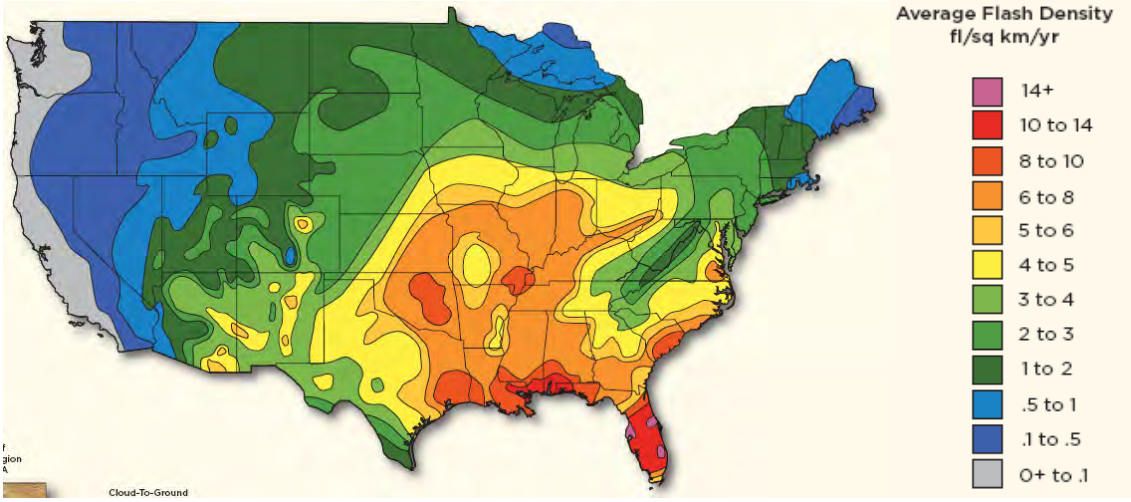
Limited: *Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours*

Although the frequency of lightning events is relatively high, the magnitude is limited. Generally damages are 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.

According to the National Weather Service, the State of Colorado ranks second nationally, behind Wyoming, with a death rate of 0.61 per one million people.[16] The following figure illustrates average flash densities of the contiguous United States from 1997 to 2007. This shows Colorado Springs being somewhere between 2 to 4 flashes per square kilometer per year (0.78 to 1.56 per square mile per year). One possible explanation for the discrepancy between Colorado's low lightning flash density and high casualty rate is that many people participate in popular outdoor activities such as hiking and camping in the exposed, lightning-prone high country.

[16] National Weather Service, "Lightning Deaths by State and Deaths Population Weighted: 1999-2008," http://www.lightningsafety.noaa.gov/stats/99-08_deaths_by_state.pdf, accessed November 19, 2009.

Figure 4-43: Cloud-to-Ground Lightning Incidents, 1997-2007



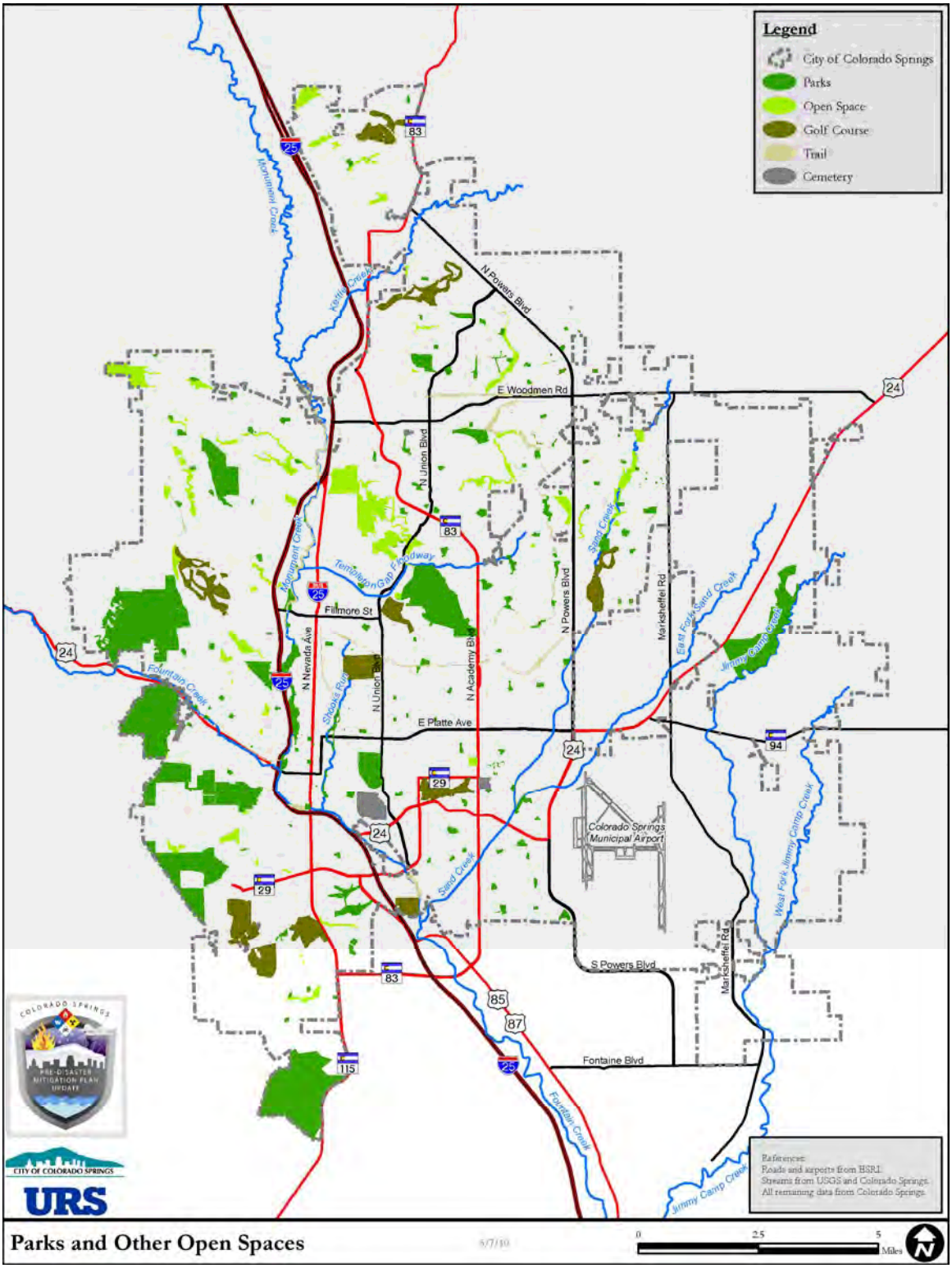
Source: NOAA's lightning safety site, http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf, accessed on November 15, 2009.

Vulnerability Assessment

Overall Summary and Impacts: 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 City of Colorado Springs 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 Colorado Springs place hikers, bikers, campers, amongst others at risk during major electrical storms. The City of Colorado Springs manages 14,500 acres of open space, trails, and parks.[17] In addition, there are over 2,200 acres of golf course land within the City of Colorado Springs. On a typical day, there are often more than 150 golfers in play on one course at any given moment.[18] The City also has more than 250 acres of cemeteries, where people are often in the open, exposed to the elements. All of these areas are typical locations where injuries and/or deaths result from major lightning events. The following figure shows the open space, golf courses, cemeteries, and parks within the City of Colorado Springs and the vicinity.

[17] City of Colorado Springs website, cultural services page, http://www.springsgov.com/Page.aspx?NavID=1214, accessed on January 22, 2010.
[18] Based on two foursomes per hole on an 18-hole golf course, +/-.

Figure 4-44: Parks and Open Spaces in Colorado Springs



Identifying Structures and Estimating Potential Losses: Lightning affects the entire planning area, including all above-ground structures and utilities. 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 during an event. Many damages and injuries caused by lightning are the result of ensuing fires. From 1993 to 2009, there were 219 fires ignited by lightning.[19]

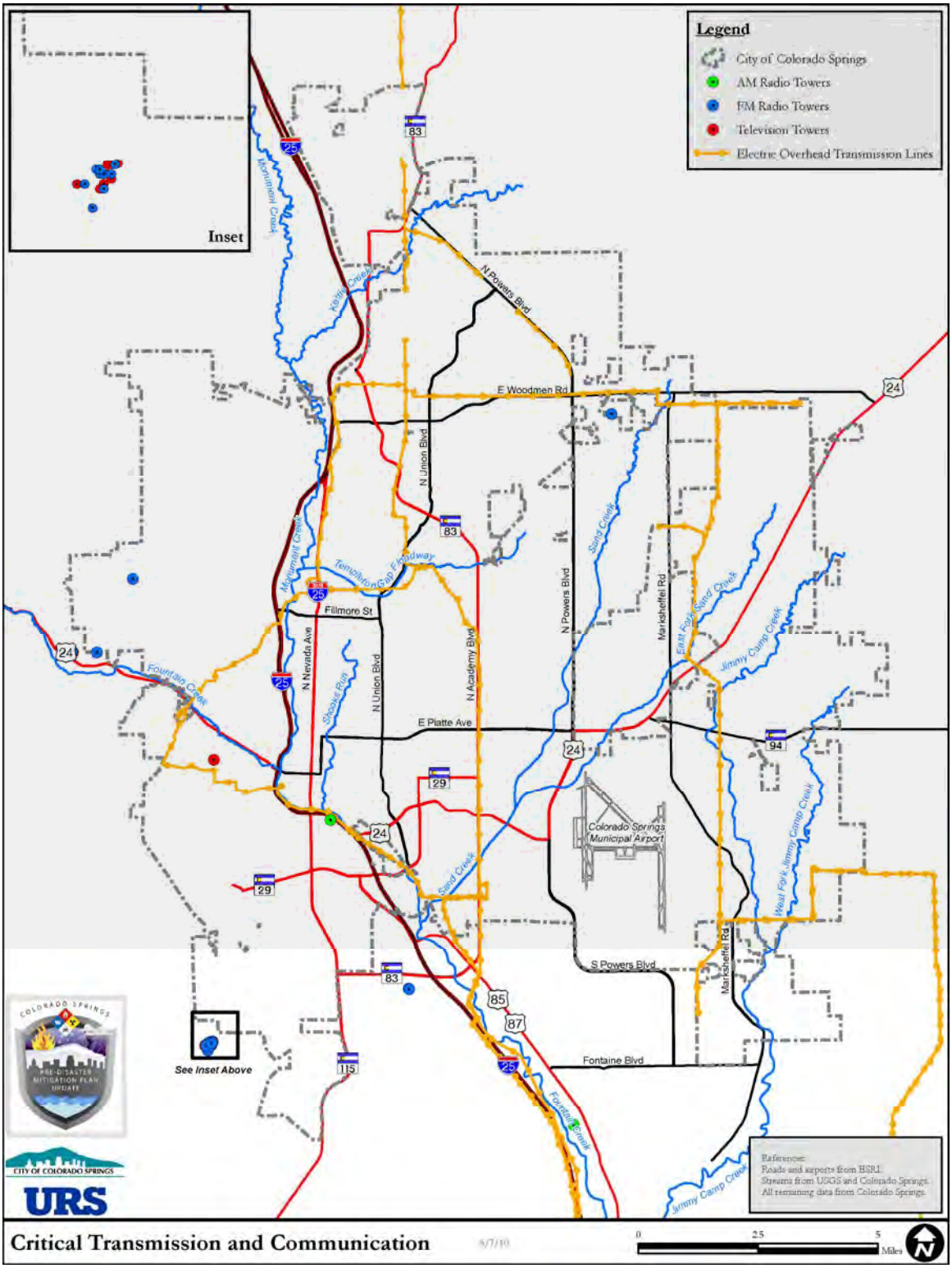
Within five miles of the City of Colorado Springs, there are 32 FCC FM towers, 28 FCC TV towers, and 3 FCC AM towers. These are utilities that could potentially be struck by and affected by lightning storms. In addition, there are roughly 110 miles of overhead transmission lines within the City of Colorado Springs. Above-ground utilities related to critical communications and transmission are depicted in Figure 4-45.

Future Development: Building standards can offer only limited protection from lightning damage. Lightning rod/grounding systems can improve the performance of a building during such an event. Fire codes in place result in fewer structure damages caused by lightning-sparked fires. Increasing population growth and development increases vulnerability to lightning.

Data Limitations: Although national weather centers keep excellent records of previous events, it should be noted that many lightning events often go unreported to the National Weather Service.

[19] Data provided by email from Bill Wallace, CSFD on January 4, 2010.

Figure 4-45: Above-Ground Utilities (Critical Communications and Transmission)



4.11 Wildfire

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.

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.

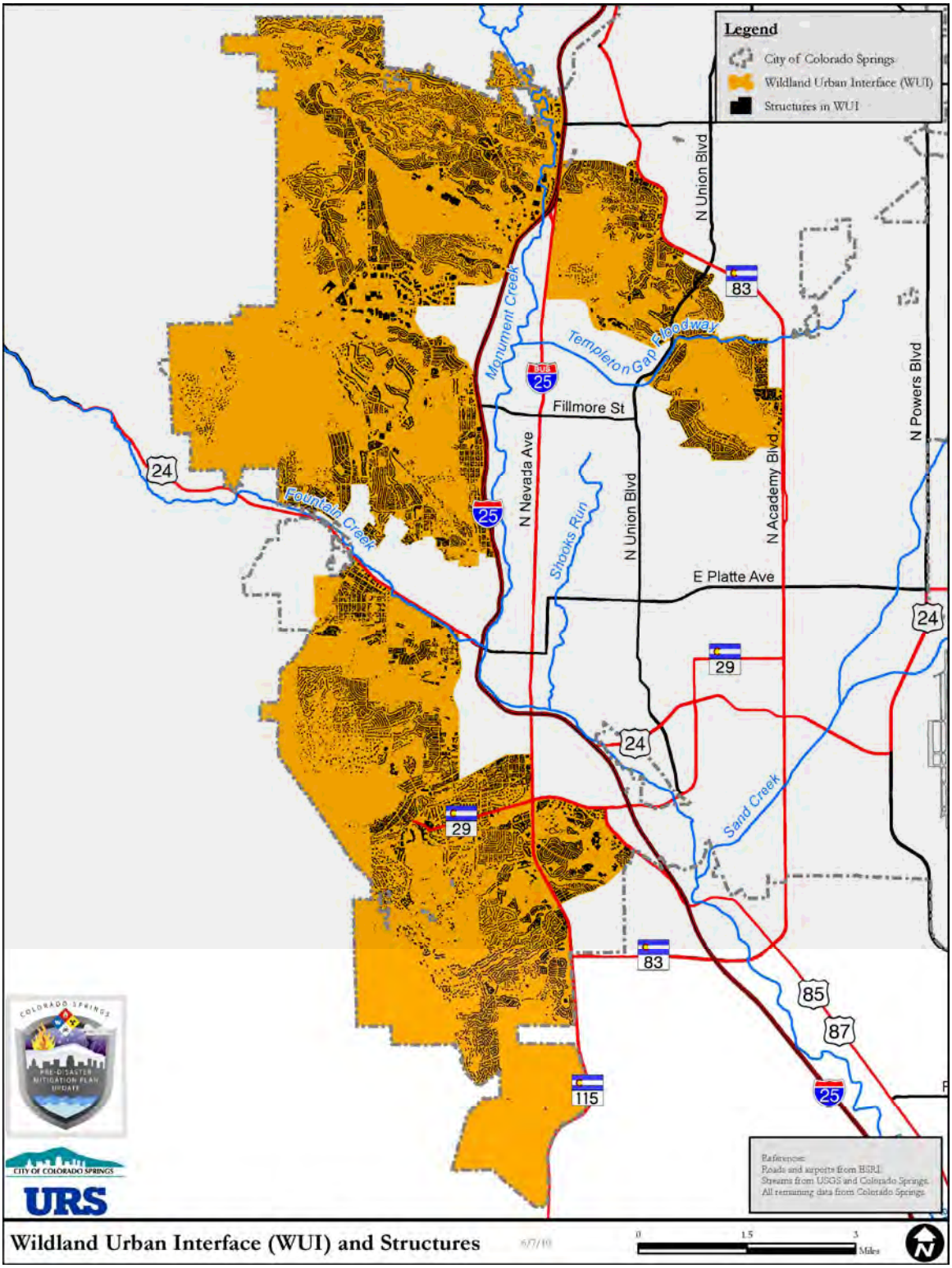
Topography, or an area's terrain and land slopes, affects its susceptibility to wildfire spread. Due to the tendency of heat from a fire to rise via convection, both fire intensity and rate of spread increases as slope increases. The arrangement of vegetation throughout a hillside can also contribute 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. Human-caused fires result from activities such as campfires, smoking, equipment use and arson.

Geographic Location

The City of Colorado Springs is currently in the process of updating the 2001 Wildfire Mitigation Plan. In this draft Community Wildfire Protection Plan 2010 (hereafter "CWPP"), the wildland urban interface (WUI) is defined as the part of the City where people and development meets wildland fuels and topography. The CWPP identifies 28,800 acres of WUI within Colorado Springs that includes 35,360 individual parcels at-risk. This equates to 23.8% of the total parcels within the City of Colorado Springs. Most of these WUI areas are in the foothills west of I-25; however, there are additional wildland characteristics on the mesas and bluffs to the east. Bordering the WUI to the west is the Pike National Forest. The following figure illustrates the 37,940 structures within the WUI in Colorado Springs.

Figure 4-46: Structures in the WUI – Colorado Springs



Previous Occurrences

Colorado experiences many wildfires on an annual basis. With its steep terrain, dense forests, and dry climate, it is expected that wildfires will always be part of Colorado's natural processes. In 2002, in the peak of one of the worst droughts in Colorado history, there were 3,067 recorded wildfires in the State, burning over 925,000 acres. In 2009, as of October 4th(a non-drought year), there were just over 1,000 fires burning a total of nearly 41,000 acres.[20]

Colorado Springs has also experienced its share of wildfires, dating as far back as 1854. In 1950, a January wildfire burned a large span of land on Cheyenne Mountain.

Table 4-45: Wildfire History in Colorado Springs and Vicinity

Date	Description	Source*
1854	Big Burn of 1854 burned a swath approximately 70 linear miles from Cheyenne Mountain to Wilkerson Pass.	2005 PDM Plan
1890	Cheyenne Mountain Burn	Draft 2010 CWPP
January1950	Camp Carson/Cheyenne Mountain Fire, claimed the lives of 9 people, including a 14-year old volunteer.	2005 PDM Plan/ Draft 2010 CWPP
4/18/2000	On Fort Carson in southern El Paso county 800 acres of grass was consumed when a power line sparked after being blown down.	NCDC
8/15/2000	A wildfire started by lightning scorched around 2,500 acres of land.	NCDC
4/28/2002	A wildfire, started by sparks from a lawn mower, consumed 64 acres and threatened 7 structures in the Pine Glen subdivision.	NCDC
5/31/2002	4,500 acres burned near Fountain, Colorado.	SHELDUS
June 2002	Hayman Fire, burned 68,000 acres in one day alone. Total losses included 137,760 acres and 600 structures. Forced the evacuation of 5,340 persons.	2005 PDM Plan
8/3/2003	A four acre fire near Ute Trail near Waldo Canyon, probably sparked by a lightning strike the day before, was contained by firefighters from six departments and air tankers. Traffic was affected on U.S. highway 24.	NCDC
2005	Westwood Fire burned 35 acres. 1 outbuilding lost.	Christina Randall
2007	Manitou Incline Fire (30 acres)	Draft 2010 CWPP
2008	Fort Carson Fire, 1 fatality of BLM pilot fighting the fire.	Christina Randall
4/15/2008	No description available	SHELDUS
5/10/2008	No description available	SHELDUS
8/1/2008	No description available	SHELDUS
2009	Coronado Fire burned 12 acres and threatened Coronado High School and Homes Middle School.	Christina Randall

* Data from SHELDUS are by county, therefore exact location is unknown. Some records may not be applicable to Colorado Springs specifically.

[20] The National Interagency Fire Center, National Year-to-Date Report on Fires and Acres Burned, http://www.nifc.gov/fire_info/ytd_state.htm, accessed on December 4, 2009.

Figure 4-47: Wildfire on Cheyenne Mountain January 17, 1950

Source: Pikes Peak Library District Special Collections Photo Archives, http://library.ppld.org/SpecialCollections/Project/Search.aspx?JFile=004-5421-di-72.jpg;&view=1, accessed on November 30, 2009.

The following table records the number of grass/brush fires that the Colorado Springs Fire Department responded to since 1993.

Table 4-46: Grass/Brush Fires CSFD Responded to, 1993-2009

Year	# of Incidents
1993	288
1994	293
1995	360
1996	416
1997	313
1998	350
1999	248
2000	277
2001	255
2002	232
2003	107
2004	114
2005	156
2006	196
2007	149
2008	220
2009	123

Source: Data provided by email from Bill Wallace, CSFD on January 4, 2010.

It is noteworthy that there is a steady decline in the number of grass fires beginning in 2001, when the wildland fire mitigation efforts began.

The following table contains the number of fires (of all types) that were started by lightning.

Table 4-47: Fires ignited by Lightning, Colorado Springs 1993-2009

Year	# of Incidents
1993	7
1994	18
1995	8
1996	16
1997	12
1998	12
1999	8
2000	23
2001	17
2002	14
2003	10
2004	9
2005	11
2006	22
2007	9
2008	9
2009	14

Source: Data provided by email from Bill Wallace, CSFD on January 4, 2010.

Probability of Future Occurrence

For the purposes of this plan, the Planning Subcommittee decided to break up probability of wildfire into two distinct categories: Significant wildfires based on historical occurrences, and typical grassfires that occur frequently every year. The probability for both categories is as follows:

Significant Wildfire
Likely: *10-100 percent chance of occurrence next year or it has a recurrence interval of 10 years or less*

According to historical data, there were 16 recorded wildfires between 1950 and 2009. Therefore, the probability of a wildfire occurring any given year is 27%. Rephrased, it is expected that a wildfire will occur once every 3.5 years.

Grassfire
Highly Likely: *Near 100 percent chance of occurrence next year or it happens every year*

According to the grass and brushfire data, it can be expected that at least 100 grass/brushfires will occur any given year, otherwise expressed as highly likely.

Magnitude/Severity

For the purposes of this plan, the Planning Subcommittee decided to break up magnitude of wildfire into two distinct categories: Significant wildfires based on historical occurrences, and typical grassfires that occur frequently every year. The magnitude for both categories is as follows:

Significant Wildfire
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*

Grassfire
Negligible: *No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services*

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. Other secondary impacts include future flooding and erosion during heavy rains. For grassfires, losses can also include loss to structures, livestock, crop lands, and natural resources, but typically result in burning of vegetation and are quickly extinguished.

Vulnerability Assessment

Overall Summary and Impacts: Due to many reasons including climate, vegetation, and increasing populations, it is likely that large-scale conflagrations will occur within Colorado and have devastating impacts. The City of Colorado Springs is taking

great leadership in mitigation and prevention of wildfires, yet the possibility of a fire that quickly burns out of control is still present for the Colorado Springs Fire Department. The relationship of the natural and built environment defines the risk of wildfires to life and property.

Identifying Structures and Estimating Potential Losses: As previously stated, there are 37,940 structures within the WUI. This is equal to 20.6% of the total structures in the City of Colorado Springs. Of the 35,360 parcels within the WUI, 28,351 of them were rated with structures. More than 51% of the total parcels in the WUI are at High, Very High, or Extreme risk to wildfire. The following table summarizes the aggregate vulnerability.

Table 4-48: Parcel Count by Total Wildfire Risk – Colorado Springs

Risk	Number of Parcels
LOW	818
MODERATE	9,284
HIGH	10,632
VERY HIGH	5,270
EXTREME	2,347
Total	**28,351**

Source: Christina Randall, electronically by email on February 8, 2010.

The following Wildfire Risk Ratings maps, Figure 4-48 through Figure 4-59, were taken directly from the draft City Colorado Springs "Sharing the Responsibility" CWPP 2010.

Figure 4-48: Wildfire Risk Ratings – Cheyenne Mountain Vicinity

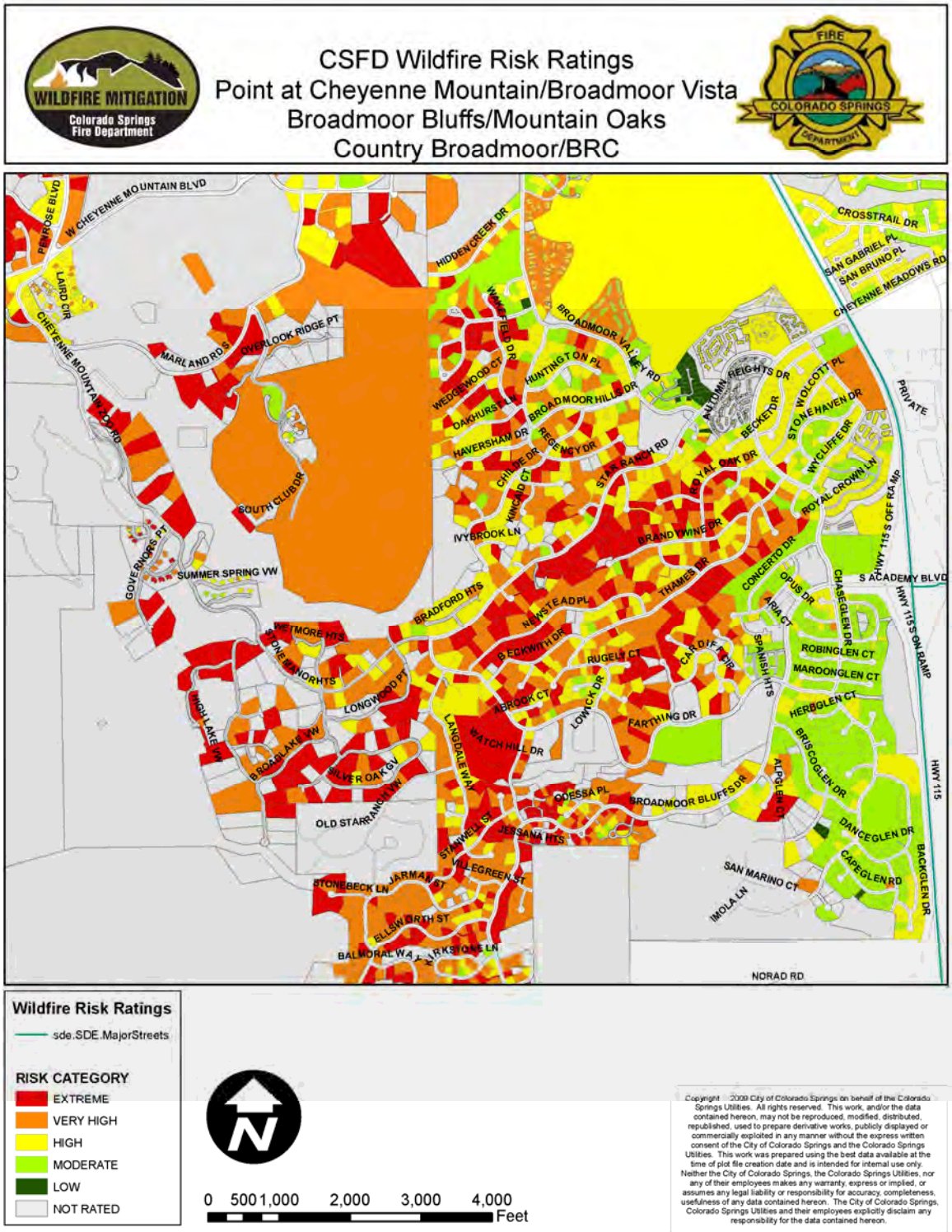


Figure 4-49: Wildfire Risk Ratings – University Park and Vicinity

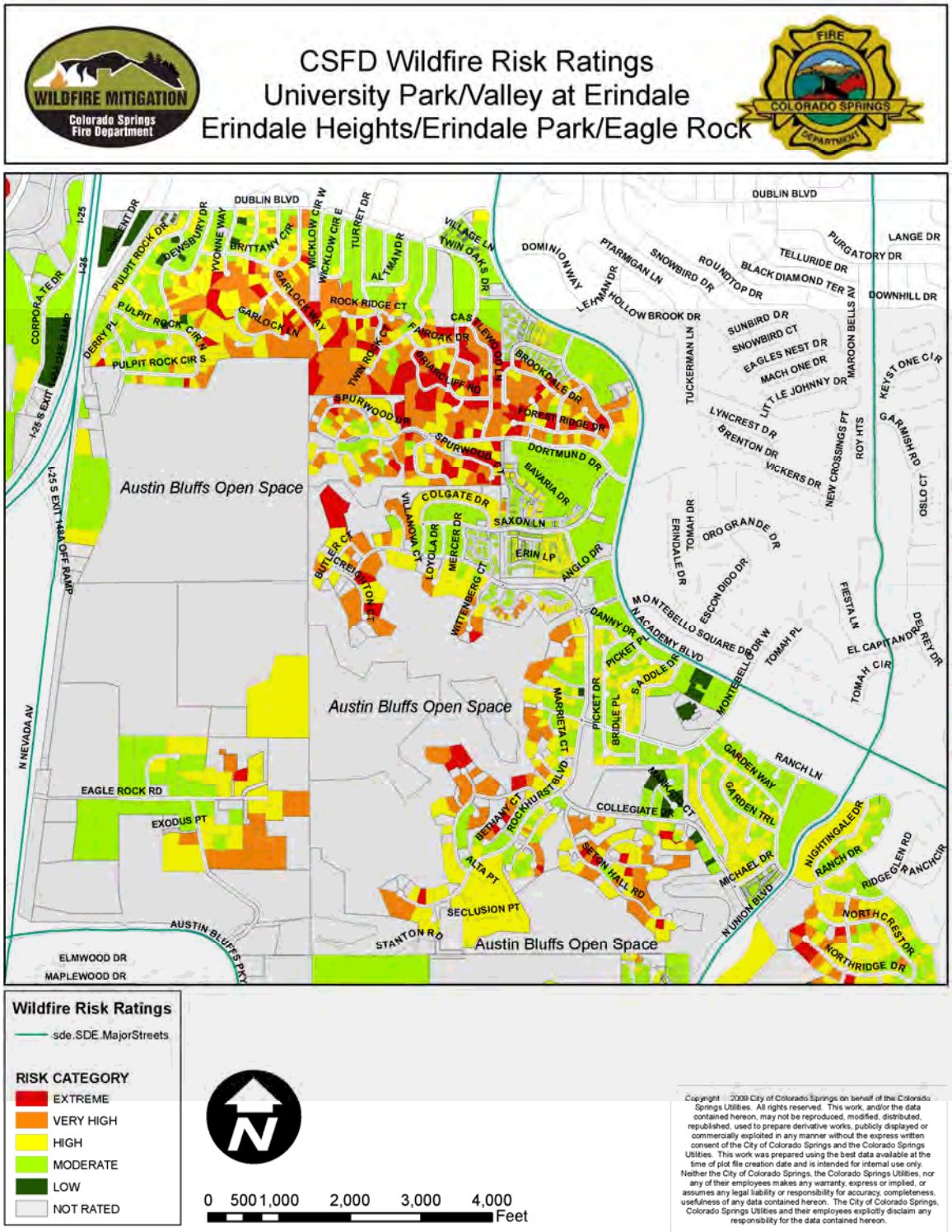


Figure 4-50: Wildfire Risk Ratings – Cedar Heights

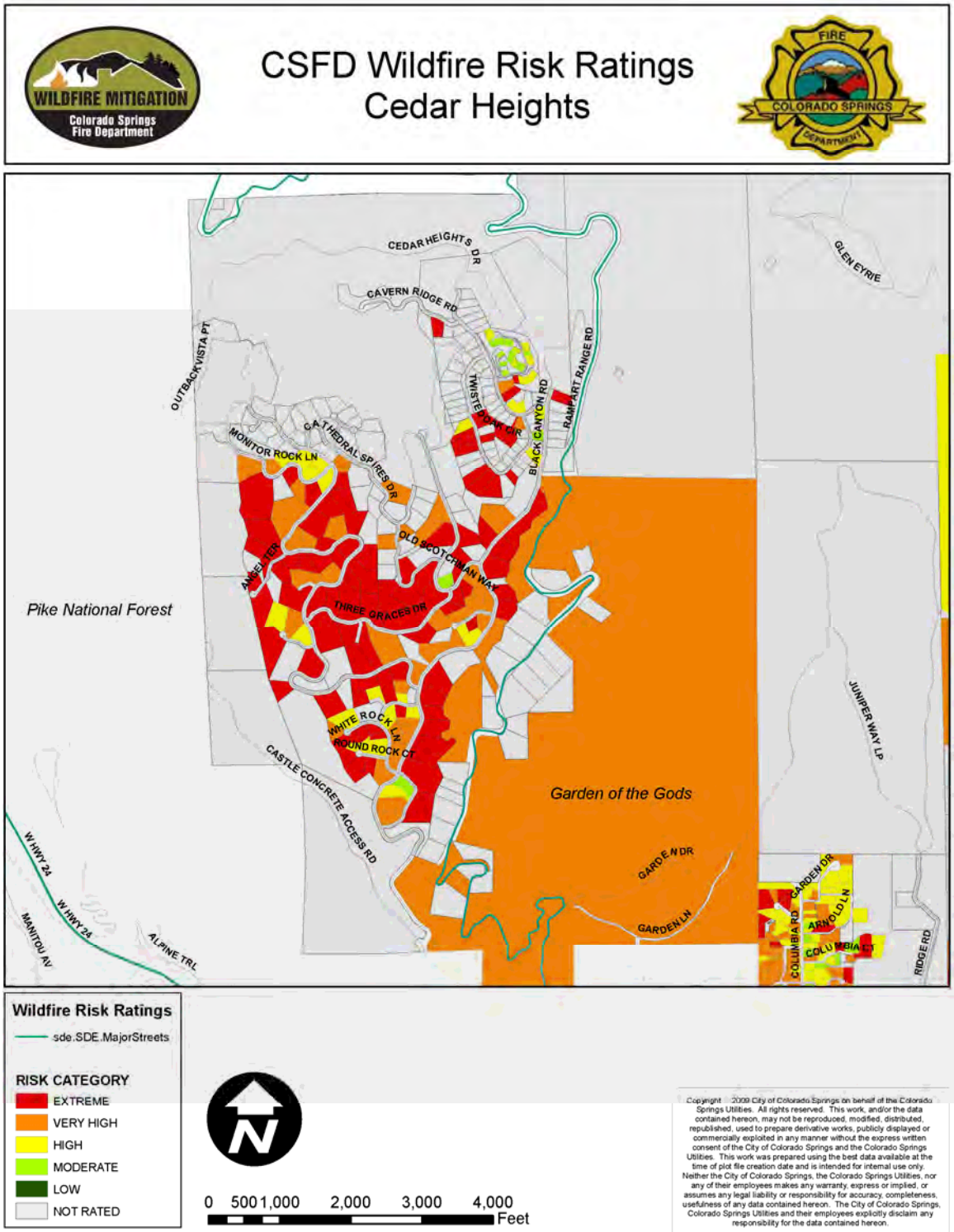


Figure 4-51: Wildfire Risk Ratings – Greencrest/Cragmor Village

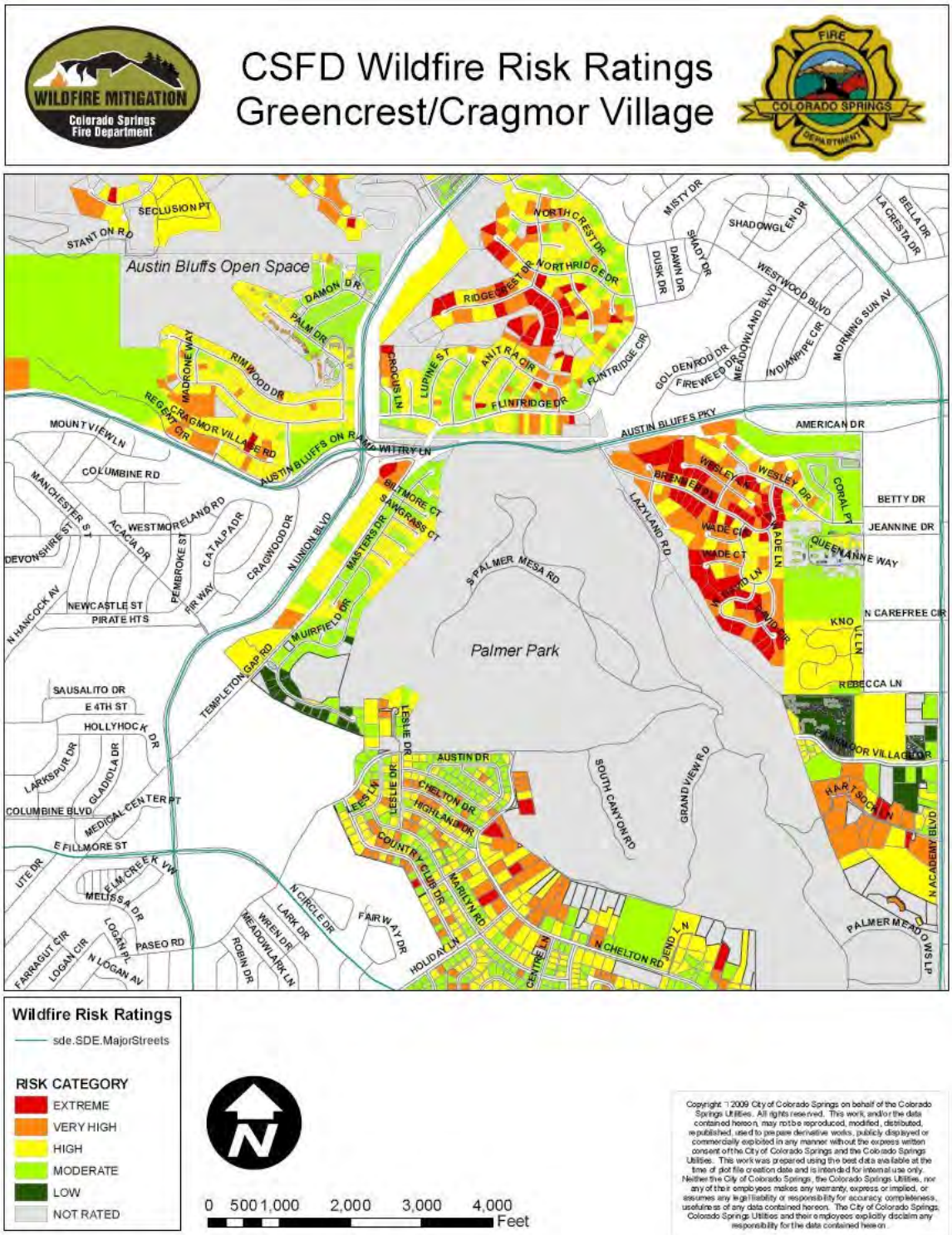


Figure 4-52: Wildfire Risk Ratings – Kissing Camels Park

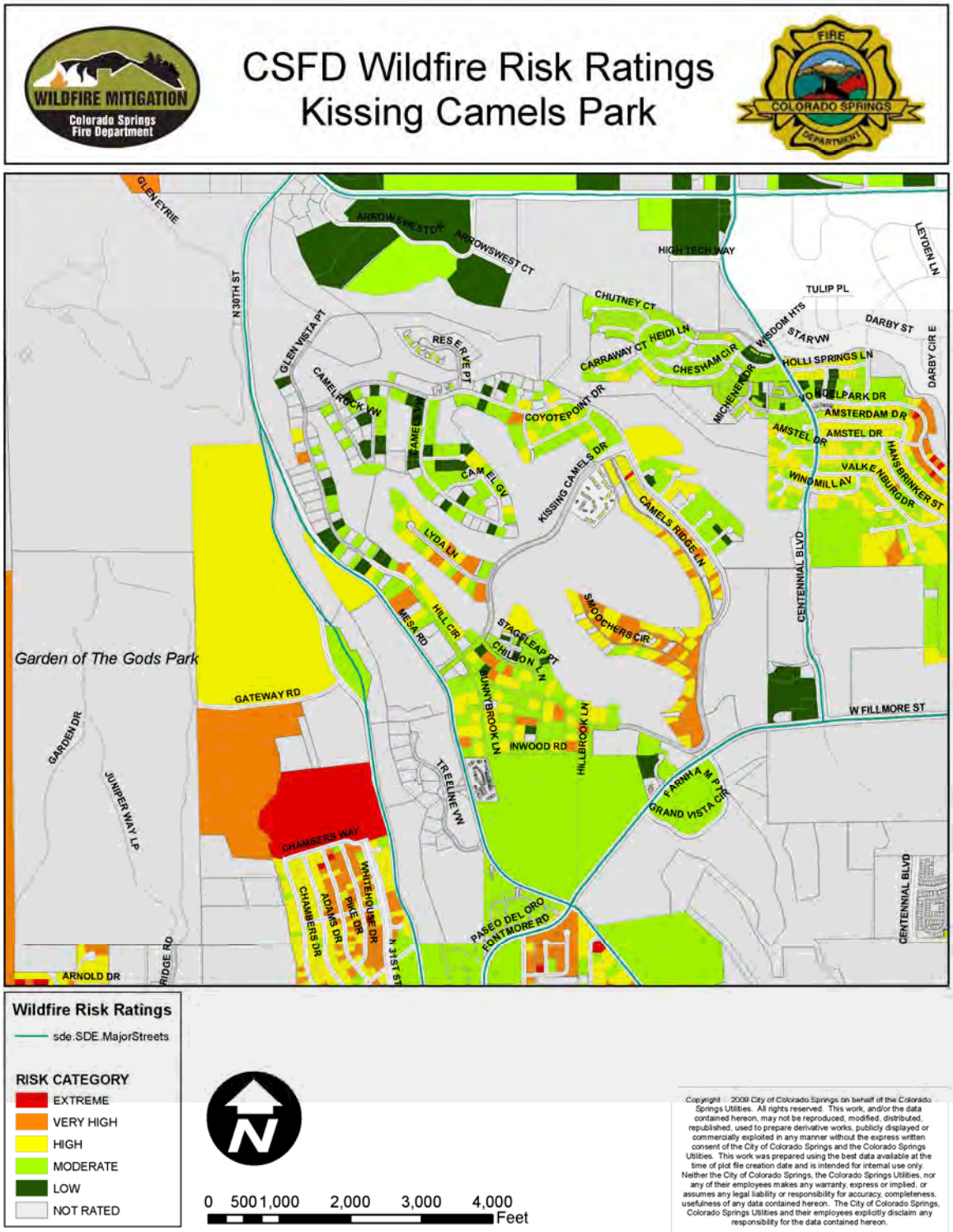


Figure 4-53: Wildfire Risk Ratings – Mountain Shadows

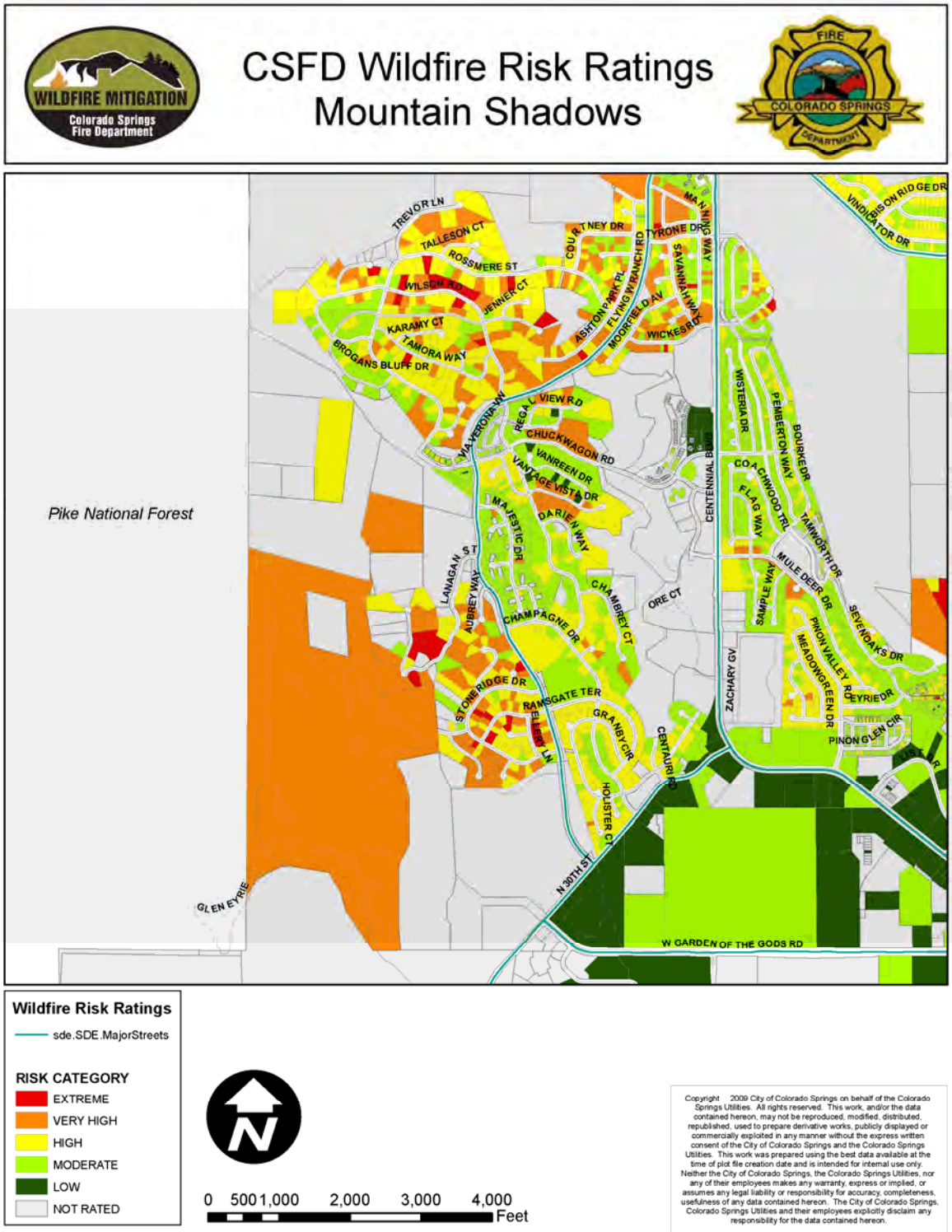


Figure 4-54: Wildfire Risk Ratings – North Cheyenne Cañon

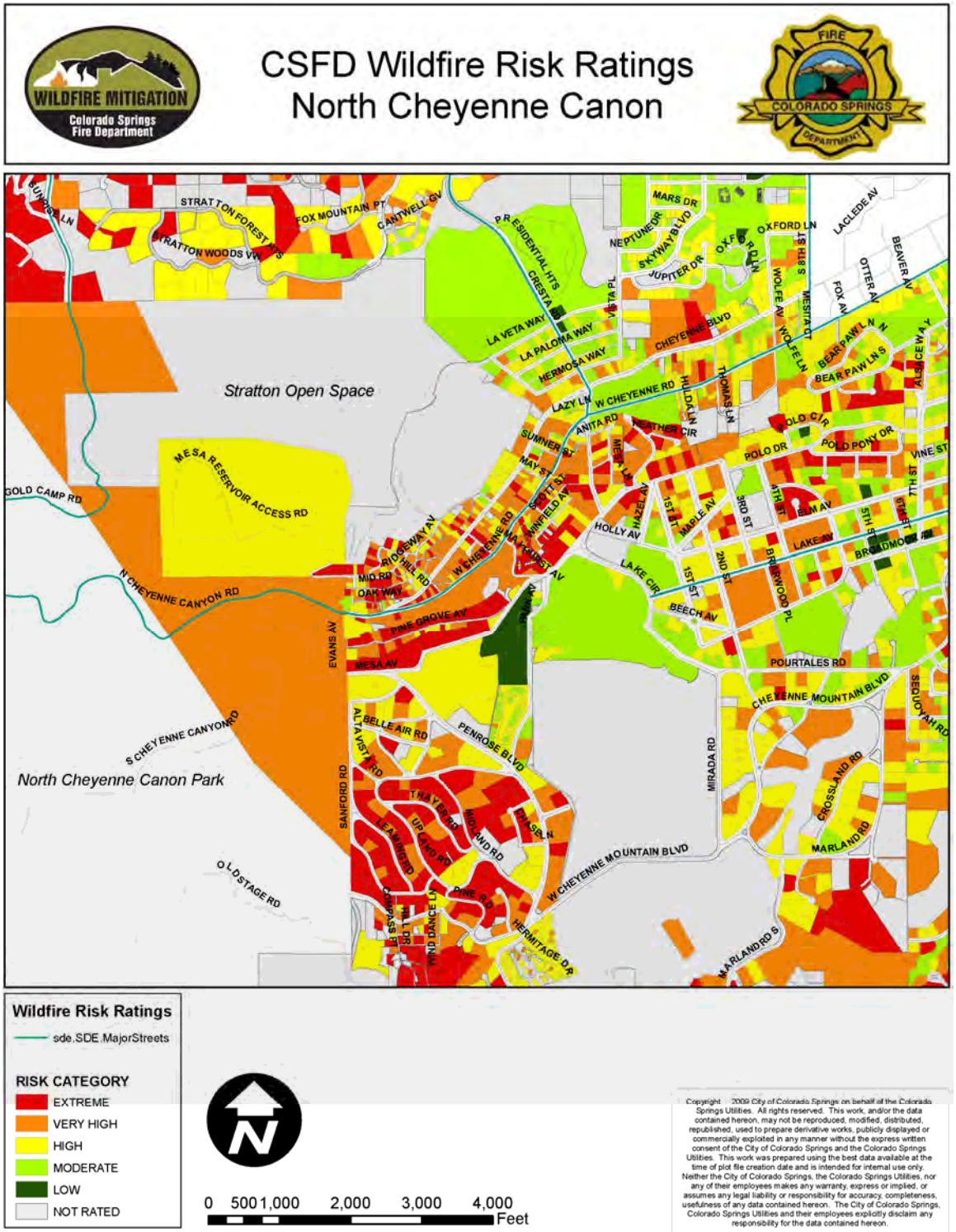


Figure 4-55: Wildfire Risk Ratings – Peregrine/Hunters Point

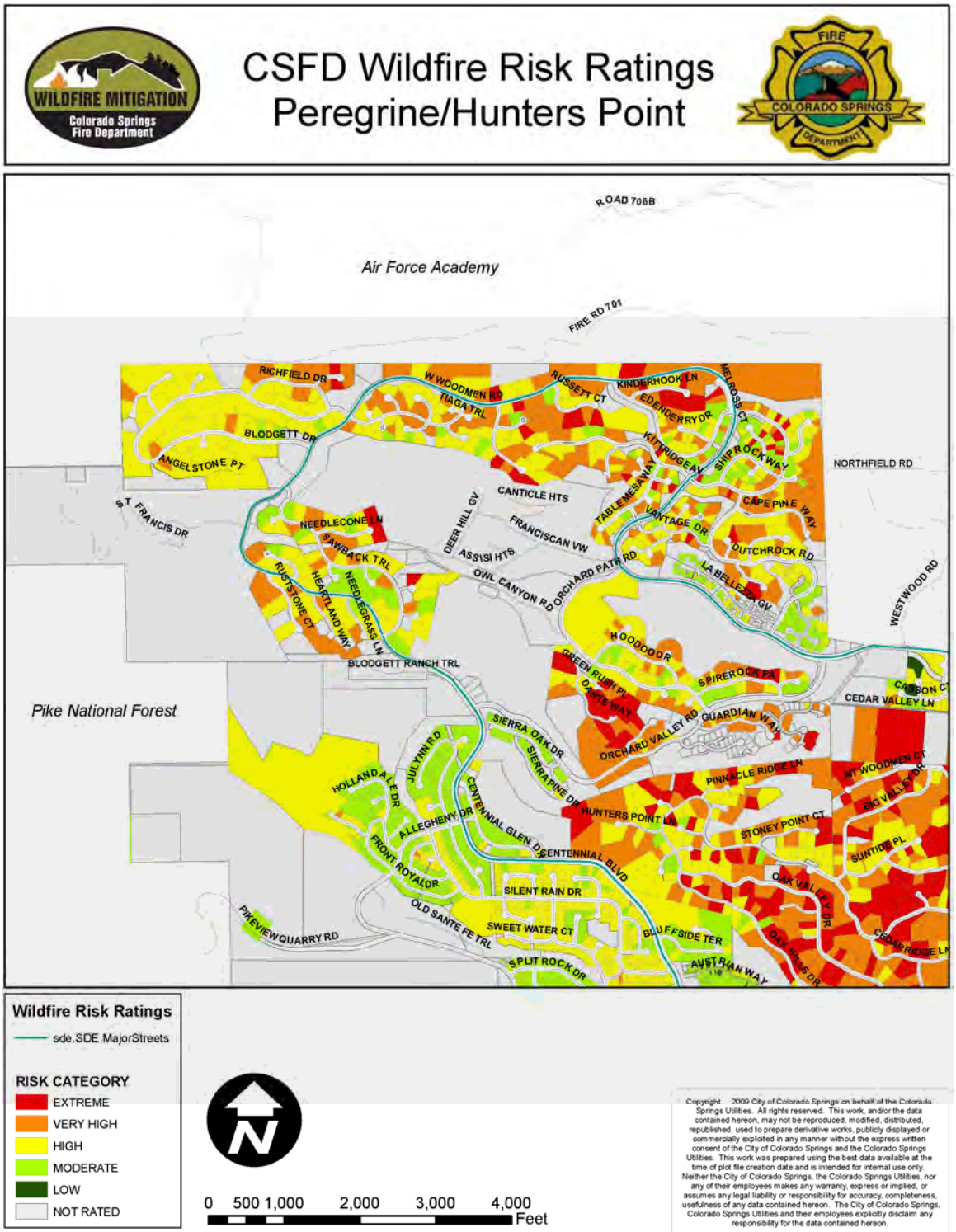


Figure 4-56: Wildfire Risk Ratings – Pinecliff

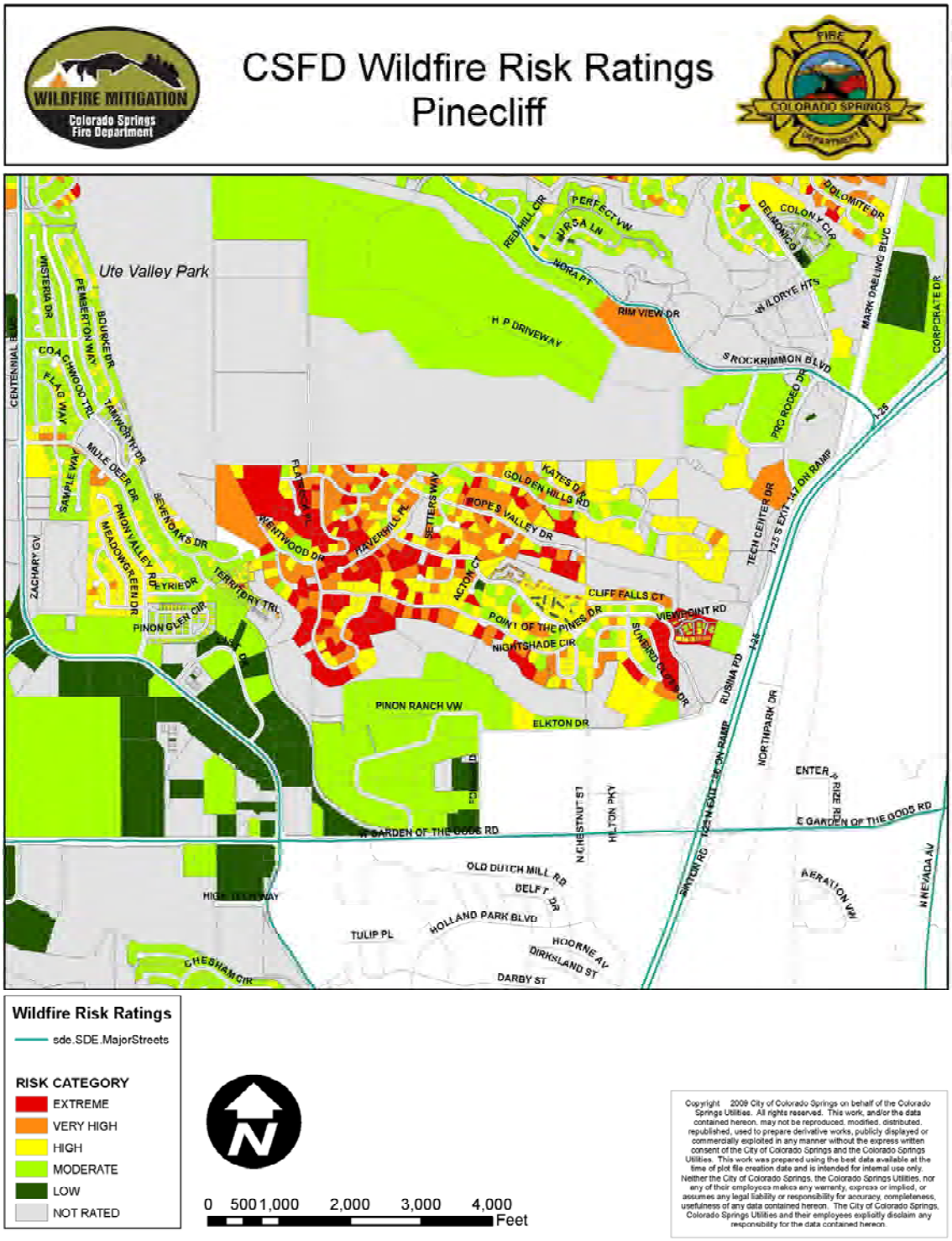


Figure 4-57: Wildfire Risk Ratings – Pleasant Valley and Vicinity

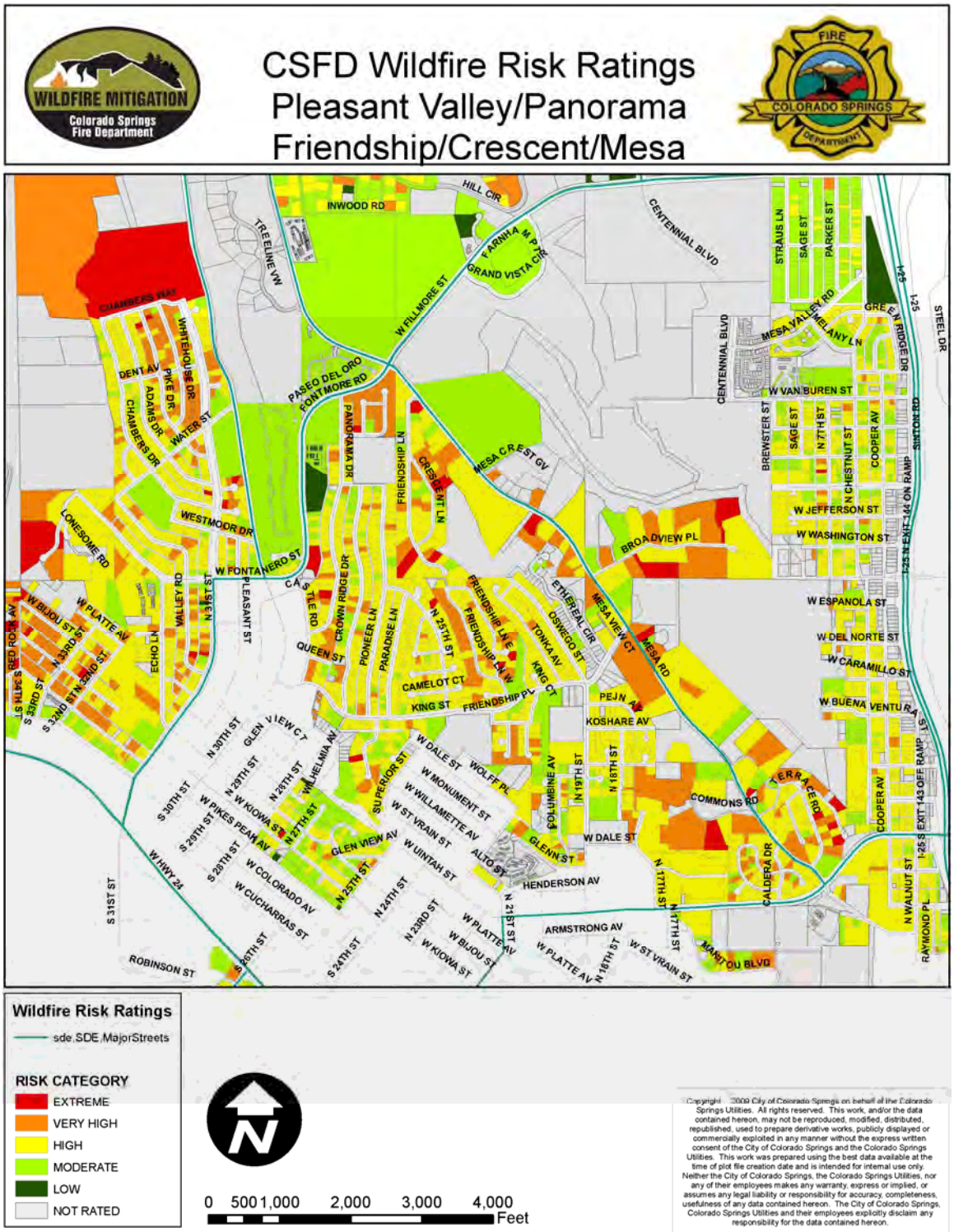


Figure 4-58: Wildfire Risk Ratings – Skyway Vicinity

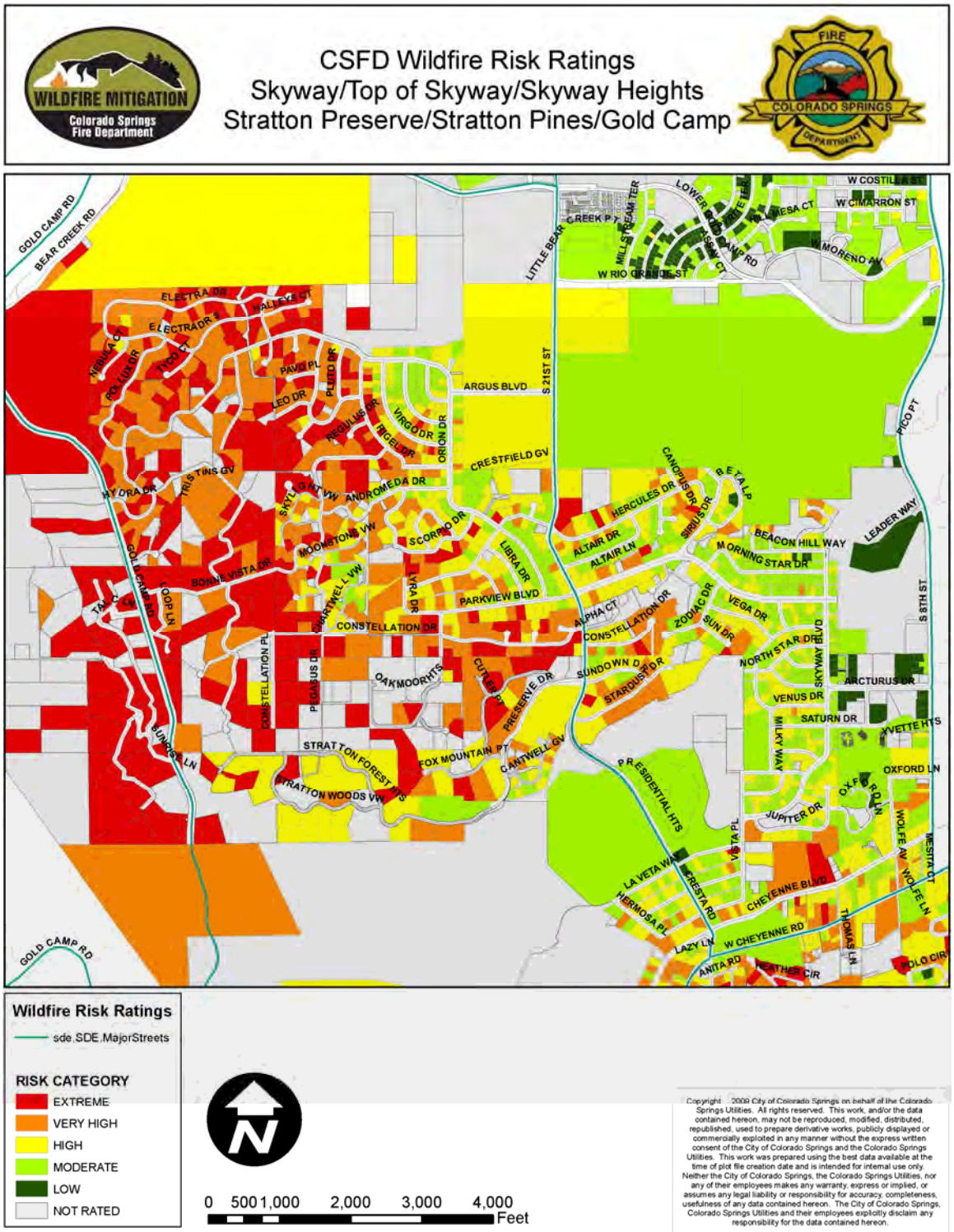
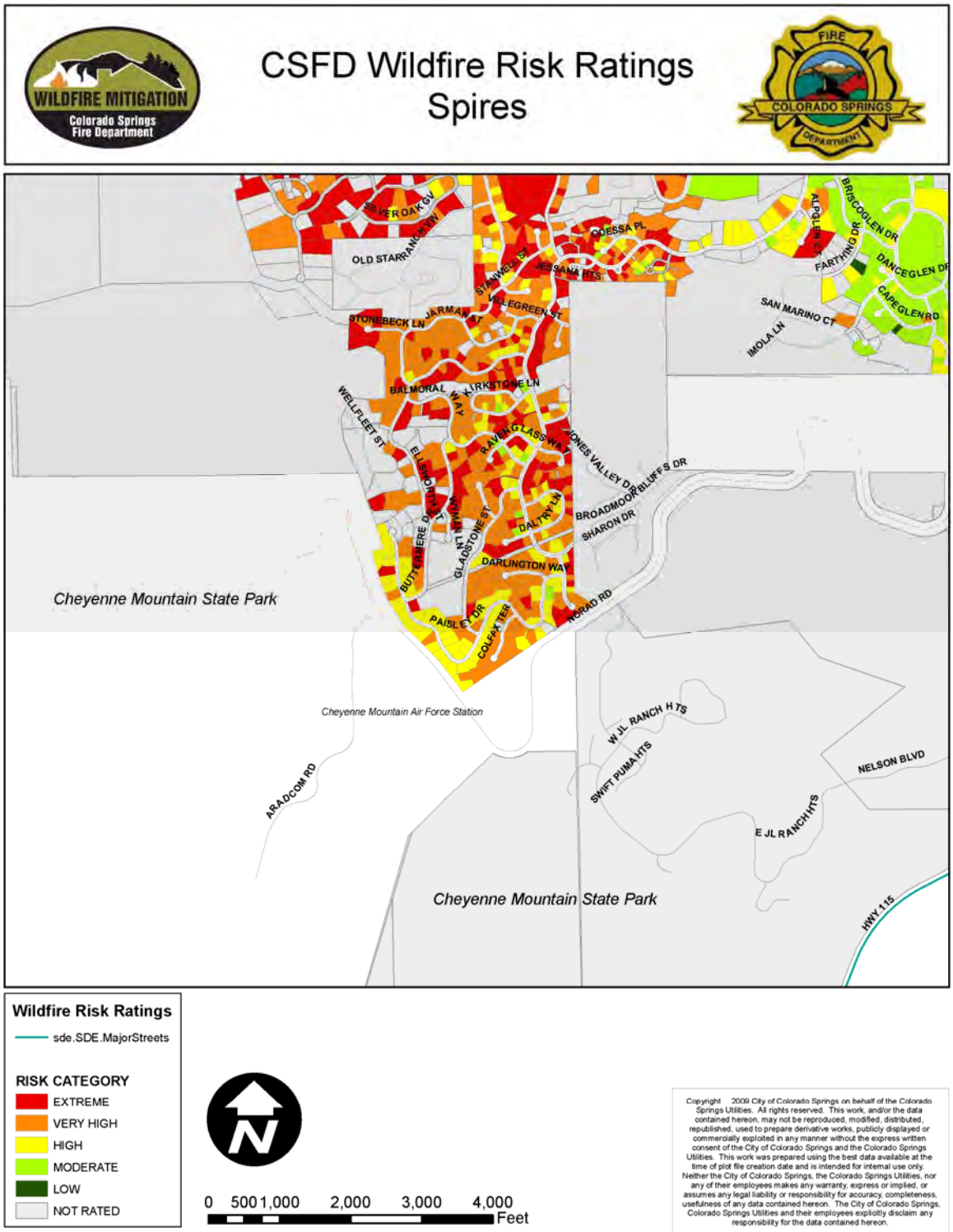


Figure 4-59: Wildfire Risk Ratings – Spires



Approximately 24% of the City of Colorado Springs population resides in the WUI. There are also 30 Parks and Open Spaces in the City that are within the WUI. These areas comprise 10,687.5 acres of the WUI. They are:

- Quail Lake Park (113 acres)
- Bear Creek Park (765.6 acres)
- Garden of the Gods (1,319.1 acres)
- North Cheyenne Canyon (1,276.9 acres)
- North Slope Recreation (2,267 acres)
- Palmer Park (730.7 acres)
- Ute Valley Park (338.4 acres)
- Austin Bluffs / Pulpit Rock Open Space (585.5 acres)
- Blodgett Peak Open Space (167.2 acres)
- Cheyenne Mountain State Park backdrop Open Space (832.5 acres)
- Manitou Section 16 Open Space (634.5 acres)
- Mesa Valley Open Space (41.8 acres)
- Red Rock Canyon Open Space (784.9 acres)
- Rockrimmon Open Space (77.9 acres)
- Sondermann Park Open Space (99.5 acres)
- Stratton Open Space (318.3 acres)
- Sunset Mesa Open Space (78 acres)
- Union Meadows Open Space (31.9 acres)
- Woodmen Valley Open Space (29.6 acres)
- Garden Ranch Open Space (1.6 acres)
- Mesa Open Space (13.6 acres)
- Mountain Shadows Open Space (98 acres)
- Neal Ranch Open Space (35.4 acres)
- Peregrine Open Space (7.5 acres)
- Promontory Pointe (3.7 acres)
- Silent Rain Open Space (2.1 acres)
- Stratton Forest Open Space (22 acres)
- University Park (6.9 acres)
- Vindicator Knob (.8 acres)
- Winfield Scott Park (3.6 acres)

In addition, the following historical, cultural, or special sites located in high risk areas were identified in the 2005 PDM Plan:

- The Broadmoor
- Cheyenne Mountain Zoo

- NORAD
- Will Rogers Shrine
- The Flying W Ranch
- The Cragmoor Sanatorium
- Glen Eyrie
- Rock Ledge Ranch
- Mount Saint Francis
- Helen Hunt Falls
- Seven Falls
- Pulpit Rock
- Starsmore Discovery Center

Future Development: Building standards can offer only limited protection from fire damage. Increasing population growth and development increases vulnerability to fires, specifically along the foothills. Within the Colorado Springs Division of the Fire Marshal, the CSFD Wildfire Mitigation Section provides several services that help reduce wildfire risk. These include community outreach and education, fuels management, stewardship agreements, development review, hazardous activity permitting, fire danger monitoring, operational support, burn bans and restrictions, grant administration, and a volunteer program. This rigorous mitigation strategy shares responsibilities amongst agencies, and promotes safer communities in the process.

Data Limitations

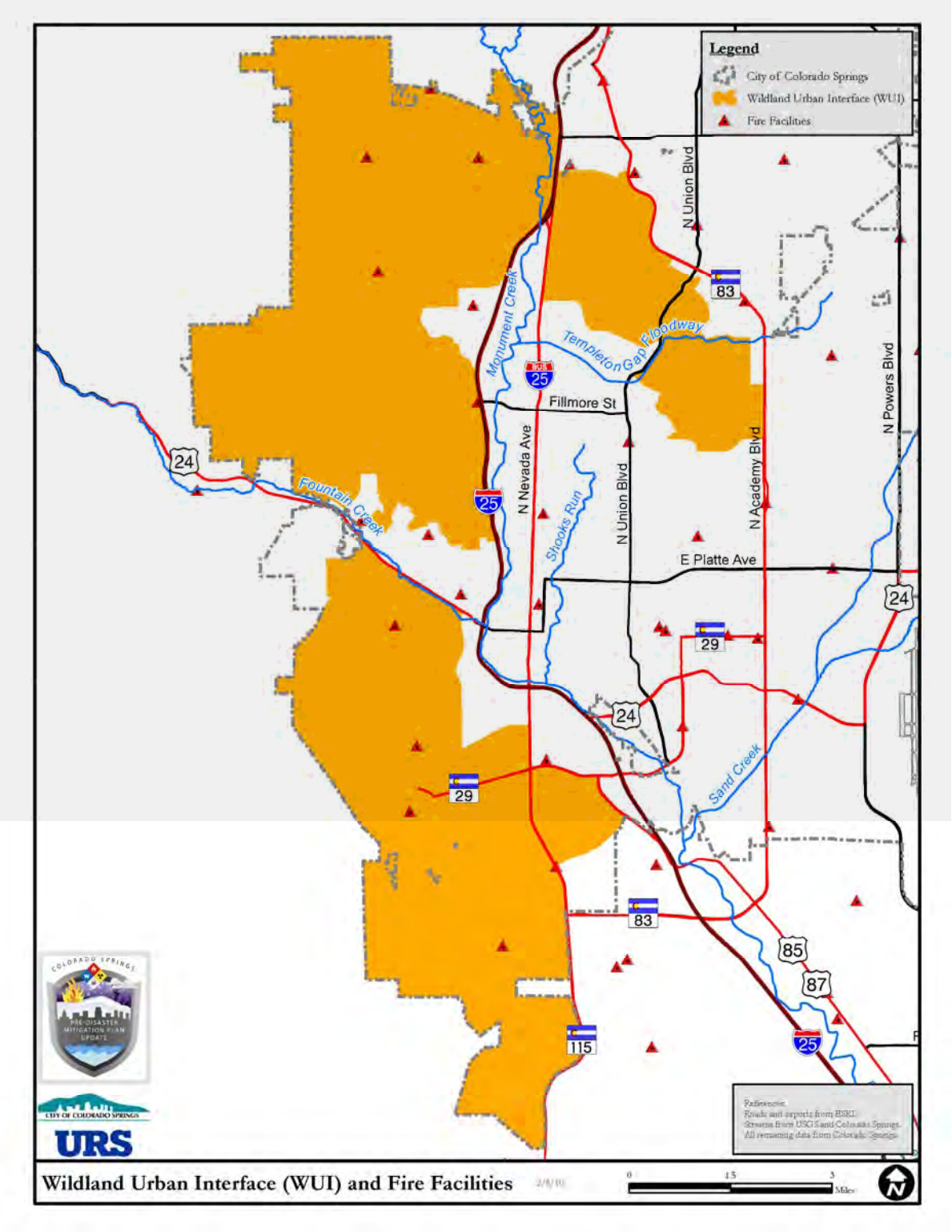
Wildfire risk maps are not wholly accurate to the parcel level. Regionally, these maps identify larger areas of concern based on slope, aspect, and fuels, however each individual parcel may contain more or less fuel, may be implementing defensible space, or may have structures made with considerably stronger materials.

Other Fire Districts in Colorado Springs: In addition to the City of Colorado Springs Fire Department, there are four other fire protection districts that serve areas within the City limits. They are:

- Black Forest Fire/Rescue Protection District
- Donald Wescott Fire Protection District
- Broadmoor Fire Protection District
- Falcon Fire Protection District

For the purposes of this PDMP Update, only data from the Colorado Springs Fire Department was included. The following map (Figure 4-60) shows the fire facility locations in relation to the WUI.

Figure 4-60: Fire Facilities in Relation to the WUI – Colorado Springs



4.12 Windstorm

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.

Geographic Location

Windstorms can occur virtually anywhere in the City of Colorado Springs with equal probability and magnitude.

Previous Occurrences

More than 100 major wind events were reported in El Paso County since 1960, some of which are outlined in Table 4-49. One major storm recently produced winds up to 60 mph ripping off large tree limbs and partially peeling the roof from the El Paso County Courthouse in downtown Colorado Springs. This event took place on June 26, 2009. Power to 1,300 customers was lost for a short time and one contractor was slightly injured at the Courthouse. A storm on March 10, 1977 was said to have killed 5 people and caused more than $170,000 in damages. A strong wind sheer of 100 mph winds hit southwest Colorado Springs in 2004, damaging roofs and generating projectiles.

Table 4-49: Partial List of Significant Wind Events in Colorado Springs and Vicinity

Date	Injuries**	Fatalities**	Property Damages ($)**	Source*
2/12/1960	6		5,000	SHELDUS
4/16/1960	0.08		794	SHELDUS
12/21/1961	0.14		172	SHELDUS
1/8/1962		0.16	7,937	SHELDUS
2/12/1962	6		5,000	SHELDUS
3/28/1962			17	SHELDUS
4/7/1962	0.02		781	SHELDUS
12/15/1964			19,231	SHELDUS
12/21/1964			19,231	SHELDUS
6/16/1965			500	SHELDUS
3/3/1966			333	SHELDUS
2/13/1967			1,667	SHELDUS
4/6/1969	0.02		79	SHELDUS
10/11/1969	0.03		794	SHELDUS
11/30/1970			794	SHELDUS
12/23/1971			5,000	SHELDUS

Date	Injuries**	Fatalities**	Property Damages ($)**	Source*
4/26/1972			33,333	SHELDUS
6/23/1975			50,000	SHELDUS
11/17/1975		0.02	11,364	SHELDUS
3/10/1977	0.03	5	172,414	SHELDUS
12/2/1977	1		4,545	SHELDUS
8/14/1978			4,167	SHELDUS
3/29/1982			1,786	SHELDUS
4/2/1982	5		178,571	SHELDUS
5/16/1983			26,316	SHELDUS
4/19/1984			794	SHELDUS
2/15/1986			500,000	SHELDUS
9/24/1986	0.02		7,937	SHELDUS
1/28/1987	0.10		238,095	SHELDUS
1/23/1988	0.12		19,231	SHELDUS
5/1/1988			12,500	SHELDUS
5/2/1988			16,667	SHELDUS
9/18/1988			31,250	SHELDUS
1/9/1989			45,455	SHELDUS
3/14/1989	0.03		12,821	SHELDUS
1/8/1990			2,941	SHELDUS
12/14/1990	0.25		31,250	SHELDUS
3/11/1991	1		1,563	SHELDUS
8/12/1993				NCDC
5/19/1994				NCDC
7/3/1995				NCDC
2/22/1996	1		66,667	SHELDUS
4/19/1996			100,000	SHELDUS
6/21/1996			40,000	SHELDUS
6/23/1996				NCDC
7/20/1996				NCDC
10/29/1996			35,714	SHELDUS
12/5/1996			33,333	SHELDUS
6/6/1997				NCDC
8/4/1997				NCDC
10/11/1997			10,714	SHELDUS
6/21/1998				NCDC
2/2/1999			10,000	SHELDUS
2/10/1999			10,000	SHELDUS
2/22/1999			2,333	SHELDUS
4/8/1999			1,737	SHELDUS
4/18/2000			625	SHELDUS
5/17/2000			1,667	SHELDUS
6/19/2000				NCDC
7/7/2000				NCDC
5/20/2001				NCDC

Date	Injuries**	Fatalities**	Property Damages ($)**	Source*
5/28/2001	7		400,000	SHELDUS
6/22/2001				NCDC
10/1/2001				NCDC
1/2/2004			50,000	SHELDUS/2005 PDM Plan
8/4/2004				NCDC
11/3/2005			33,333	SHELDUS
5/22/2006				NCDC
8/6/2007				NCDC
12/30/2008			666,667	SHELDUS
6/26/2009	1		--	NCDC
7/29/2009				NCDC

* Data from SHELDUS are by county, therefore exact location is unknown. Some records may not be applicable to Colorado Springs specifically. All events from NCDC were listed as occurring in Colorado Springs.
**Damages, Injuries, and Fatalities for any one documented disaster within the SHELDUS database are divided between the affected counties.

Figure 4-61: Multiple Trees Uprooted in a Colorado Springs Windstorm, 1900

Source: Pikes Peak Library District Photo Archives, http://library.ppld.org/SpecialCollections/Project/Search.aspx?JFile=001-3533-di-72.jpg;&view=1, accessed on November 30, 2009.

Probability of Future Occurrence

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

The 91 major wind events since 1960, listed in Table 4-49 indicate that a major wind event will occur every year in Colorado Springs, or 1.6 per year.

Magnitude/Severity

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

Any structures and above ground utilities are vulnerable to damages caused by major wind events. Major wind events can cause downed trees and power lines, damages to structures and fences, and send dangerous debris into the air leading to more damages, injuries, and potential deaths.

Vulnerability Assessment

Overall Summary and Impacts: Predicting a major wind storm is nearly impossible, however it is expected that major wind events will occur every year. Damages from winds are primarily to structures, trees, utilities, and crops. Streets lined with older, unstable trees present specific hazard to passersby, structures, and automobiles.

Identifying Structures and Estimating Potential Losses: Data is not currently available that identifies specific costs for an individual event within the City of Colorado Springs.

Within the city limits or within five miles of the City of Colorado Springs, there are 32 FCC FM towers, 28 FCC TV towers, and 3 FCC AM towers. These are utilities that could potentially be damaged or destroyed during a major wind event. In addition, there are roughly 110 miles of overhead transmission lines within the City of Colorado Springs. As with tornadoes and lightning, severe windstorms can impact these overhead utilities (Figure 4-62).

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. The City Forestry Division maintains over 118,500 trees within the city limits. Through the 2008 Forestry Management Plan, and by city ordinance, the City Forestry Division is responsible for maintaining the overall health of the city's forests and taking necessary abatement actions when appropriate. Figure 4-63 and Figure 4-64 are maps of the tree density and forest canopy, respectively, within the City of Colorado Springs. On Figure 4-63, notice the density of structures within the areas of the city with the highest densities of tree cover. These areas are particularly vulnerable during major wind events. In addition, according to assessor's parcel data, there are 5,816 parcels within the City of Colorado Springs where the 'Year-built' of the structure on record is over 100 years old. Older buildings are typically more vulnerable to major wind events.

Figure 4-62: Above-Ground Utilities (Critical Communication and Transmission)

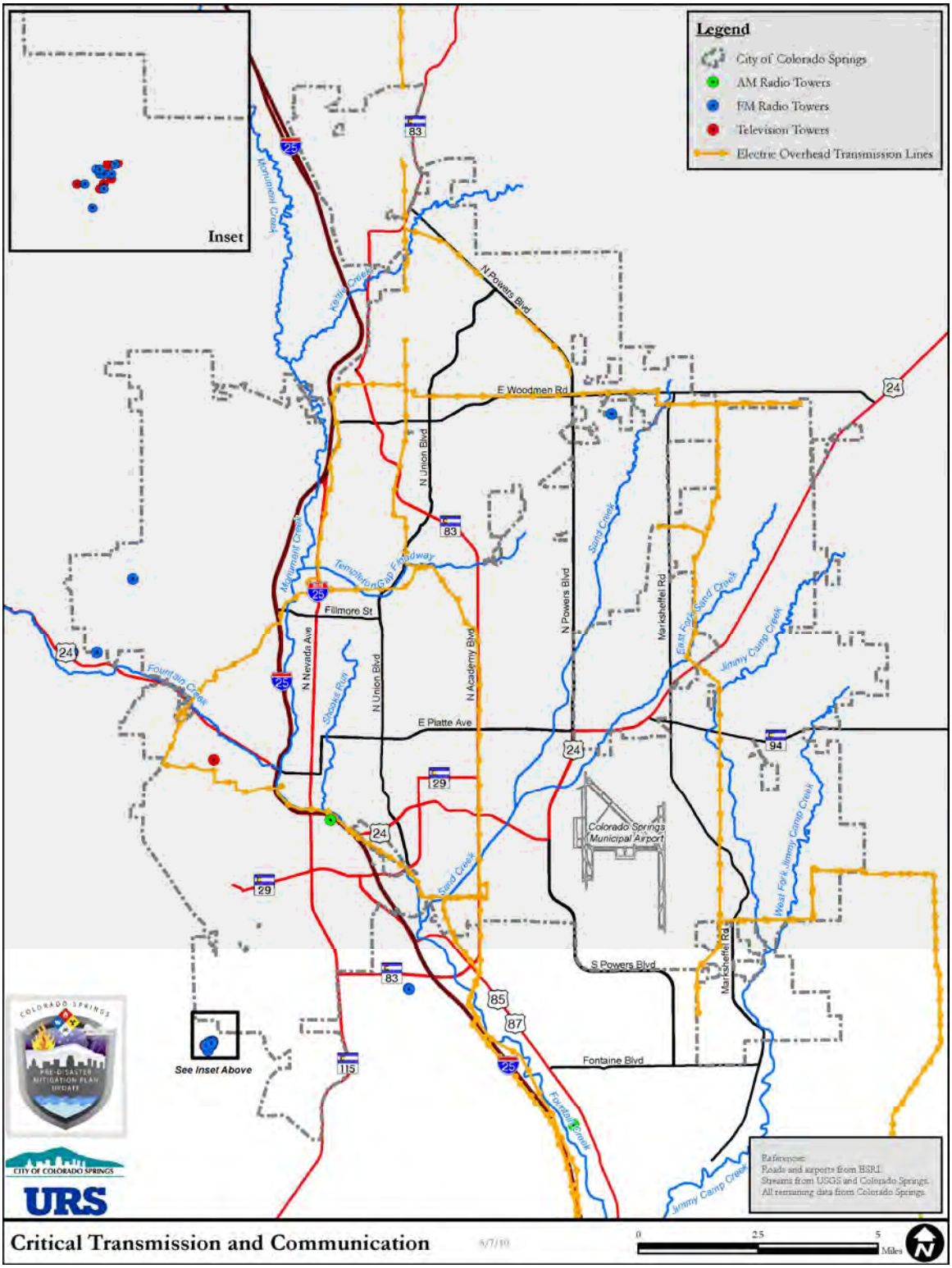


Figure 4-63: Tree Density (per acre) in Colorado Springs

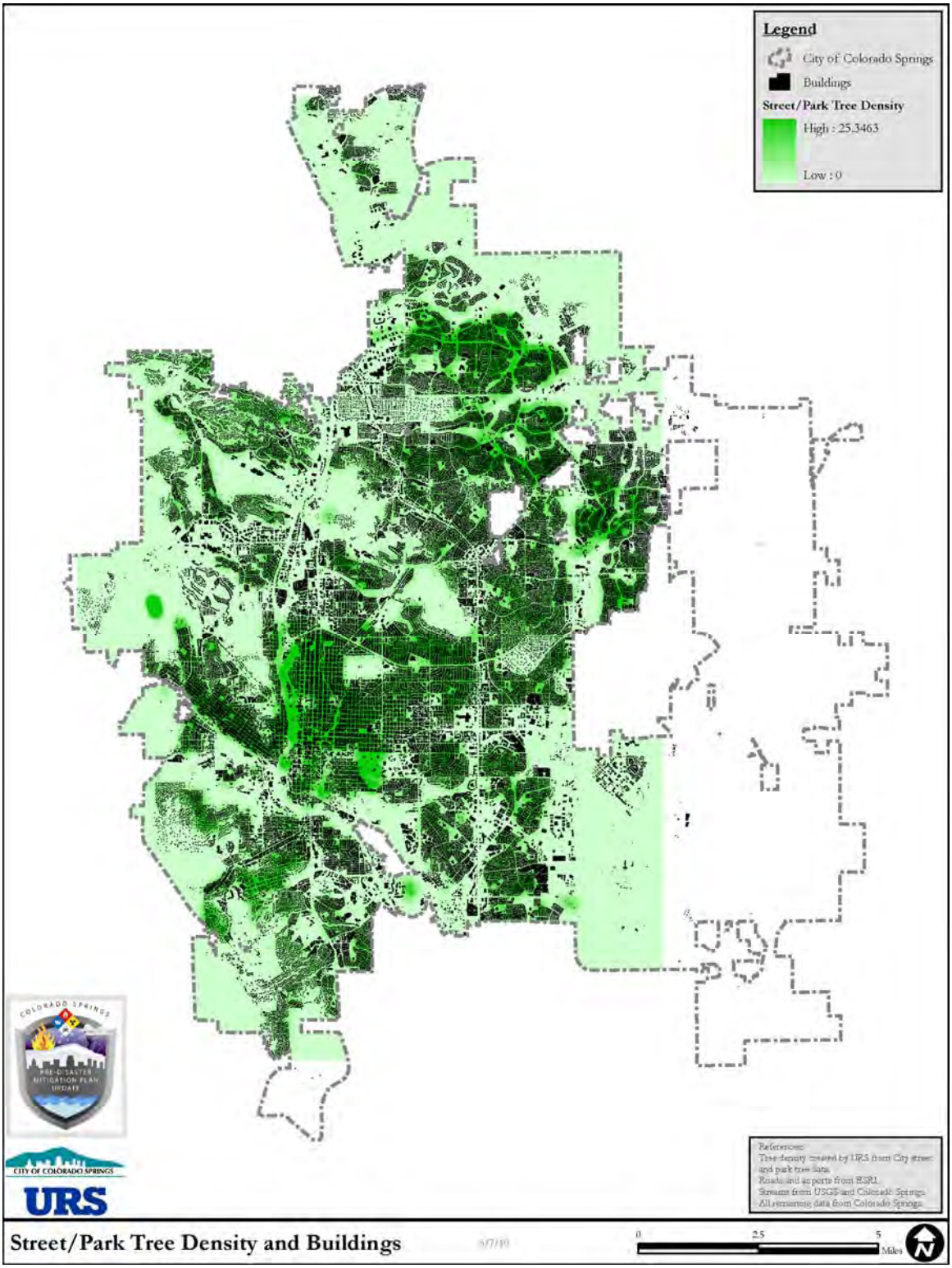
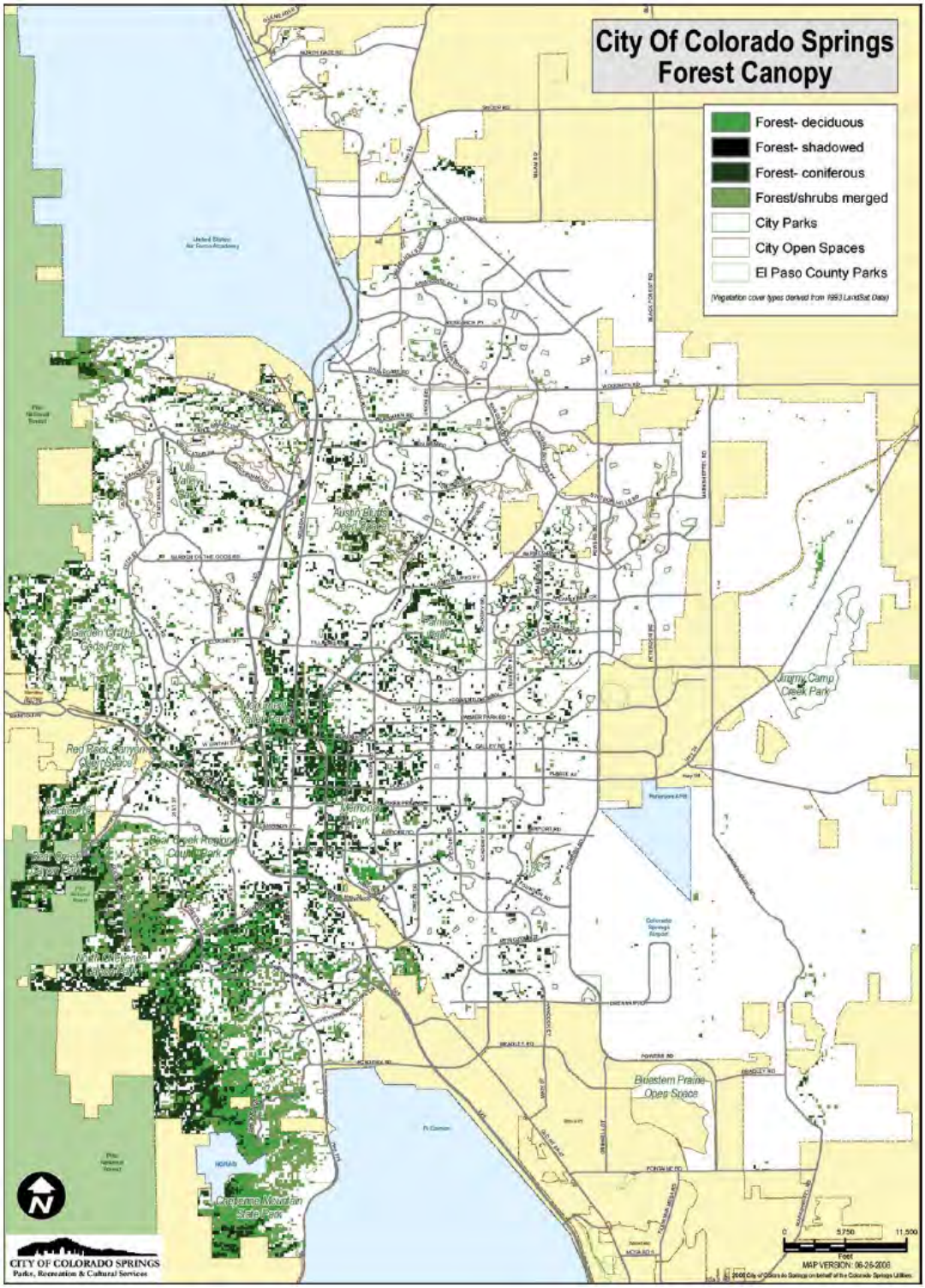


Figure 4-64: City of Colorado Springs Forest Canopy



Source: City of Colorado Springs Forest Management Plan 2008, online at http://www.springsgov.com/Page.aspx?NavID=1207, accessed on January 22, 2010.

Future Development: Building codes help to diminish potential damages to future structures during a major wind event. However, as development continues, the overall vulnerability to windstorms will increase.

Data Limitations

Major wind storms are often secondary effects of other severe weather events. Therefore, many major windstorms are not classified as such. Also, major wind events often go unreported to the National Weather Service or other archiving agencies.

4.13 Winter Storm

Hazard Description

Severe winter storm hazards may include snow, ice, blizzard conditions, and extreme cold. Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Extreme cold often accompanies or follows a winter storm.

Geographic Location

Winter storms can occur anywhere in the City of Colorado Springs, but can differ in severity depending on the location within the city. The higher elevations to the north and west typically receive more snow during a winter storm event. The foothill elevations are particularly affected during orographic snow events, where a low pressure system drives moist air over the mountains. The air rises and cools, developing clouds where heavy precipitation often spills into the foothills.

Figure 4-65: Major Snow Storm in 1913, View on Pikes Peak Avenue

Source: Pikes Peak Library District Special Collections Photo Archives, http://library.ppld.org/SpecialCollections/Project/Search.aspx?JFile=013-145-di-72.jpg;&view=1, accessed on November 30, 2009.

The following table below indicates that from 1948-2009, as recorded at the Colorado Springs WSO AP weather station, the coldest month on average is January, with an average minimum temperature of 16.5°F and maximum of 42.5°F. The highest annual snowfall was 89.4 inches during the winter of 1956-1957, which included 42.7 inches during April 1957. The coldest temperate on record was -27°F on February 1, 1951. Table 4-50 summarizes the winter weather statistics for Colorado Springs. Winter is defined as December, January, and February for this data.

Table 4-50: Colorado Springs Winter Weather Summary

Station	Winter Average Maximum	Winter Average Minimum	Extreme Minimum Temperature /Date	# Days Max Temp< 32°F /Year	Average Annual Snowfall	Snowiest Month/ Average Inches
Colorado Springs WSO AP	43.8°	18.0°	-27°/ February 1, 1951	25	40.37″	March/8.57″

Source: Western Regional Climate Center, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?co1778, accessed November 30, 2009.

Previous Occurrences

There have been 78 severe winter storms recorded in El Paso County, many of which directly impacted Colorado Springs. The following table shows the results from the SHELDUS database for storms from 1960 to 2005. In addition, the National Climatic Data Center (NCDC) listed 39 major winter storm events since 2003. It is important to note that SHELDUS data provides information on a county average basis. The number of injuries, fatalities, and property damages associated with a particular event are equally distributed amongst the affected counties for that hazard event. For example, if 5 deaths were attributed to a blizzard that affected 20 counties, then each county would show 0.25 deaths for that event.

Table 4-51: Significant Winter Storms in Colorado Springs and Vicinity (SHELDUS)*

Date	Injuries**	Fatalities**	Property Damages ($)**
1/14/1960			12
2/20/1960			22
4/30/1960			0
1/10/1963			79
4/18/1966			79
4/13/1967	0.07	1	185
4/20/1967			0
5/1/1967			0
10/13/1969			0
9/16/1971			794
2/19/1976		0.02	0
11/10/1978		0.06	0
12/5/1978		0.02	0
11/19/1979	0.02		794
3/27/1980			1,667
3/31/1980			16,667
3/31/1980			1,667
3/4/1981			14
2/1/1982	1		79
12/23/1982		0.1	793,651
3/14/1983			794
12/20/1983			21,739
10/15/1984	0.02	0.02	11,111
1/30/1985		0.08	794
1/31/1985			794
9/28/1985			2,632
12/8/1985	0.05		2,632
10/10/1986			847
1987***			$587,000
2/1/1989	0.32		79,365
2/1/1989	0.05		794
3/23/1990			10,000
3/2/1992	0.02		1,064
3/8/1992			3,571
1/26/1994		1	0
10/24/1997	0.29	0.71	171,429
2/18/1998		1	0
4/2/2001			24,000
4/11/2001			4,000,000
4/5/2005			250,000

* Data from SHELDUS are by county, therefore exact location is unknown. Some records may not be applicable to Colorado Springs specifically.
**Damages, Injuries, and Fatalities are divided between the affected counties for any one documented disaster within the SHELDUS database.
***According to the Colorado State Hazard Mitigation Plan.

Table 4-52: Significant Winter Storms in Colorado Springs and Vicinity (NCDC)

Date	NCDC Description
2/5/2003	Heavy Snow
2/18/2003	Heavy Snow
3/17/2003	Winter Storm
4/23/2003	Heavy Snow
12/8/2003	Winter Storm
1/20/2004	Heavy Snow
2/19/2004	Heavy Snow
3/4/2004	Heavy Snow
4/22/2004	Winter Storm
4/25/2004	Heavy Snow
11/1/2004	Winter Storm
11/27/2004	Winter Storm
12/21/2004	Heavy Snow
1/28/2005	Winter Storm
3/30/2005	Winter Storm
10/10/2005	Winter Storm
11/14/2005	Heavy Snow
12/1/2005	Heavy Snow
1/16/2006	Heavy Snow
3/20/2006	Winter Storm
10/17/2006	Winter Weather
11/28/2006	Winter Storm
12/19/2006	Winter Storm
12/20/2006	Winter Storm
12/28/2006	Winter Storm
1/21/2007	Winter Weather
2/16/2007	Winter Weather
3/24/2007	Winter Weather
4/6/2007	Winter Weather
4/8/2007	Winter Weather
4/24/2007	Winter Storm
5/6/2007	Heavy Snow
5/23/2007	Winter Weather
3/2/2008	Winter Storm
4/16/2008	Winter Storm
11/29/2008	Winter Storm
1/12/2009	Winter Weather
3/26/2009	Winter Storm
4/17/2009	Winter Storm

Source: NCDC database accessed November 2009.

Probability of Future Occurrence

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

The data suggest that there have been 78 severe winter storm events since 1960, or over 1.5 times per year. It is expected that a severe winter storm will occur every year in Colorado Springs or its vicinity.

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*

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.

Vulnerability Assessment

Overall Summary and Impacts: Winter storms in Colorado Springs cause widespread impacts. The greatest threat is to public safety on major roads and highways. Power outages caused snow, ice, and wind accompanied by cold temperatures creates additional need 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.

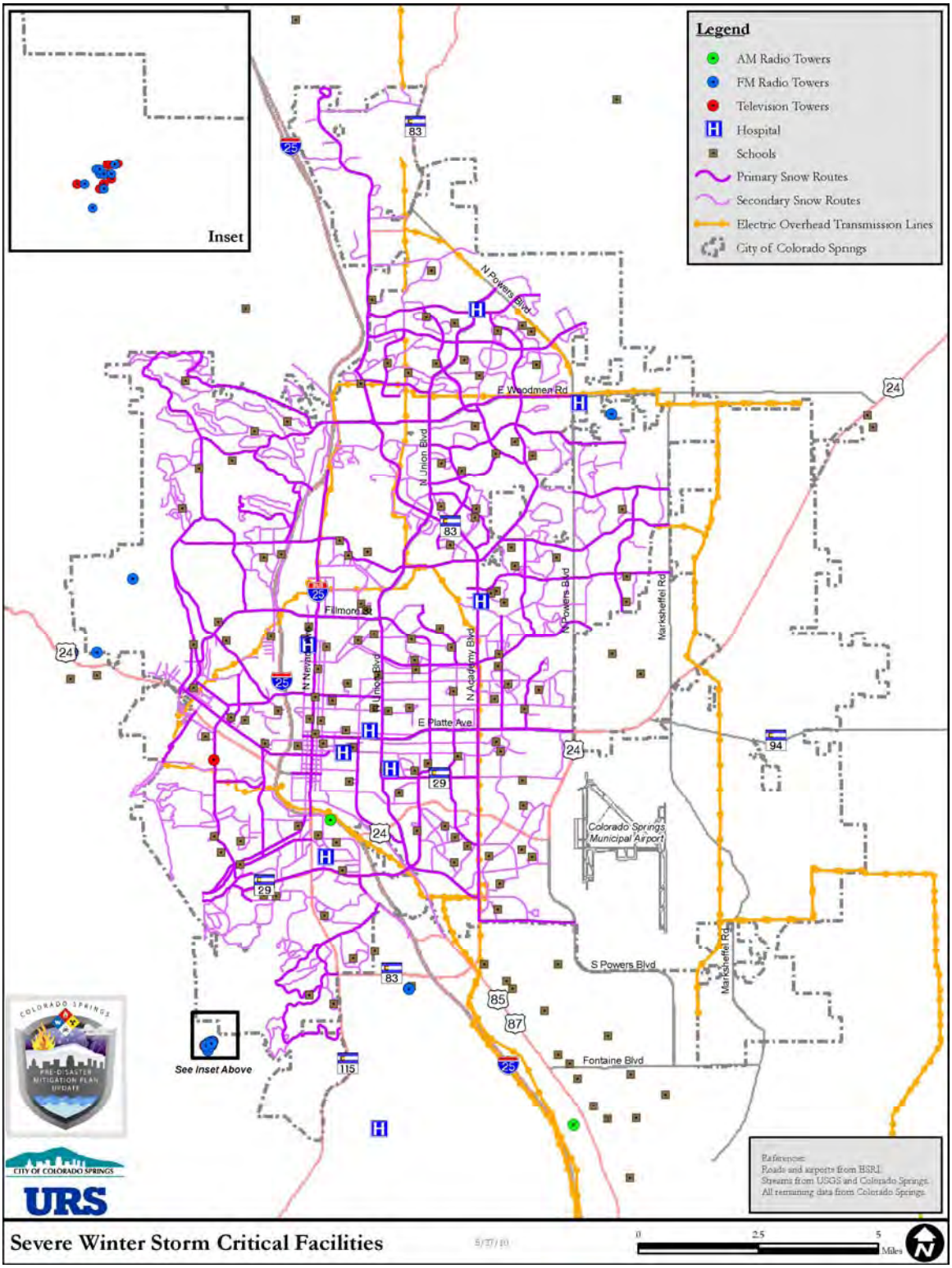
Estimating Potential Losses: Winter storms affect the entire planning area, including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be other costs associated with lost time, maintenance costs, and contents within structures. Estimated costs for individual winter storm events are not readily available from the City of Colorado Springs, however the Colorado State Hazard Mitigation Plan mentioned that a storm in 1987 cost the City of Colorado Springs an estimated $575,000.

Future Development: New structures built in Colorado Springs should be able to withstand significant snow loads when constructed to City building codes. Development on the fringe may be more susceptible to access issues for emergency services and road crews. Figure 4-66 shows the City's primary and secondary snow routes, which are determined by considering the location of essential facilities (schools, hospitals, others) related to critical services such as police, fire, and ambulatory services.

Data Limitations

Weather data is limited by the observations reported; many events are never reported or recorded with the National Weather Service or other archiving agencies.

Figure 4-66: Severe Winter Storm Critical Facilities



4.14 Hazard Profile Summary

The 2005 PDMP listed flood, wildfire, landslides, and severe weather as the hazards most likely to impact the city. Table 4-53, below, is a summary of the risk assessment probability and magnitudes, and the overall hazard risk ranking for the City of Colorado Springs based on the survey of SMAs and research for this PDMP update. These ranking will be reviewed regularly by the Office of Emergency Management to ensure that hazards are prioritized in a way that focuses resources where they are most needed.

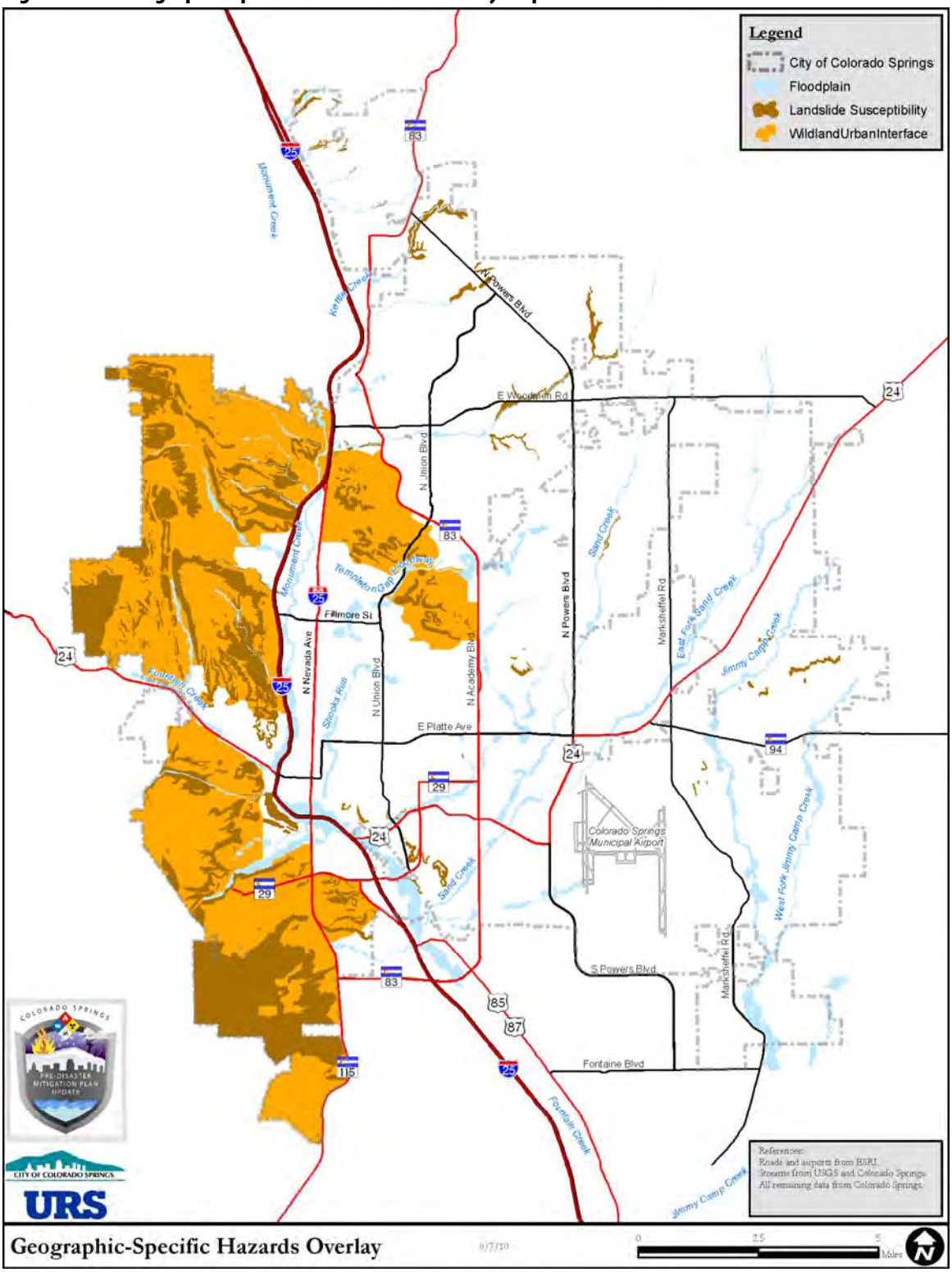
Table 4-53: Overall Risk Ranking of Hazards

Hazard	Probability	Magnitude	Risk Ranking*
Significant Wildfire	Likely	Critical	1
Grassfires	Highly Likely	Negligible	1
Severe Winter Storm	Highly Likely	Limited	2
Flood - Significant	Occasional	Critical	3
Flood - Typical	Highly Likely	Limited	3
Tornado	Likely	Critical	4
Drought	Occasional	Limited	5
Dam and Levee Failure	Unlikely	Catastrophic	6
Earthquake - Significant	Unlikely	Catastrophic	7
Earthquake - Typical	Occasional	Negligible	7
Landslides	Likely	Critical	8
Hail	Highly Likely	Limited	Not ranked
Lightning	Highly Likely	Limited	Not ranked
Windstorm	Highly Likely	Limited	Not ranked

* based on survey of 55 Subject Matter Authorities (SMAs), perceived threat of natural hazards – number 1 being the largest perceived threat.

Figure 4-67 is a natural hazard susceptibility overlay map. This map illustrates the areas in the city that may be prone to multiple hazards that affect specific geographic locations. These geographic-specific hazards include floodplains, landslide susceptibility zones, and the wildland urban interface. The remaining hazards, such as hail, lightning, wind, and tornados are those that can occur anywhere in the city and therefore are not mapped. The overlay shows that generally the western half of the city is particularly susceptible to natural hazards, due to the steeper slopes, dense forests, and proximity to vulnerable rock formations.

Figure 4-67: Geographic-Specific Hazards Vulnerability Map



4.15 Community Asset Inventory

This section identifies the assets within the City of Colorado Springs that could potentially be impacted by natural hazards. By identifying these assets, the City of Colorado Springs gains a better understanding of how a particular natural hazard event may impact the community. This section addresses EMAP Standard 4.3.2.

The City of Colorado Springs is the second largest municipality in the state. The Colorado State Demographers Office estimated a population of 400,411 in 2008 for the City of Colorado Springs.[21] Population estimates for El Paso County in 2008 were 597,249. The rate of increase in population from 2000 to 2008 was 1.3% for Colorado Springs, and 1.7% for El Paso County. Projections are not available for individual municipalities in Colorado; however the State Demographers Office projects an El Paso County population of 924,997 in the year 2035, greater than the population of Denver County (770,556 in 2035).[22] This is nearly double the population from the 2000 Census for El Paso County (520,571).

There are 183,904 buildings in the City of Colorado Springs ranging from office buildings downtown to sheds on agricultural parcels.[23] Depending on the natural hazard, each building is potentially at risk of being damaged.

Future annexations, improved markets, and higher employment rates would likely lead to an increase in new construction in the future. Table 4-54, below, illustrates the downward trend, beginning in 2005, in building permits issued for new construction in the City of Colorado Springs. This can be largely attributed to periods of economic recession over the past decade.

Table 4-54: Permits Issued for Colorado Springs, 2000-2009

Year	Single-Family Residential	New Commercial
2000	2,957	2,228
2001	3,102	2,329
2002	3,157	2,293
2003	2,843	2,164
2004	3,454	1,954
2005	3,178	2,043
2006	1,855	1,889
2007	1,395	1,993
2008	899	1,608
2009	672	780

Source: Pikes Peak Regional Building Department (PPRBD), http://www.pprbd.org/PublicAccess/Charts.aspx, accessed on January 19, 2010.

[21] Colorado State Demographers Office, http://www.dola.colorado.gov/dlg/demog/population/estimates/Table6a-08final.xls, accessed on December 3, 2009.

[22] Colorado State Demographers Office, Projections table, http://www.dola.colorado.gov/dlg/demog/population/forecasts/counties5yr.xls, accessed on December 3, 2009.

[23] According to City GIS data provided to the consultant.

Critical Facilities and Infrastructure

Critical (or essential) facilities can be described as services, places, or key infrastructure and resources that are integral for day-to-day operations for the function of the city. These facilities are especially important to the city during and after a hazard event. Critical facilities include hospitals, schools, fire stations, and more. Critical facilities typically fall within the Critical Infrastructure and Key Resources (CIKR) categories defined by the Department of Homeland Security (listed in Table 4-55).

There are more bridges in El Paso County (612) than any other county in Colorado.[24]

Table 4-55: Critical Facilities by Category

Category/Sector	Examples
Water	Reservoirs, stormwater system, wastewater facilities
Emergency Services	Fire stations, police stations, etc.
Communications	Telephone lines, radio towers, cellular service
Gas/Electric	Natural gas lines, power lines, gasoline stations
Healthcare and Public Health	Hospitals, urgent care facilities, doctor's offices
Food/Grocery	Restaurants, grocery stores, markets
Transportation	Major roads, bridges, bus stations, airports
Banking	Banks and other financial institutions
Government Facilities	City hall, jails, military installations
Nearby Dams	Dams (private and public)
Computer Driven Technology	Fiber-optic and cable
Nuclear Materials/Waste	Nuclear power plant, waste storage facility
Chemical Facilities	Propane storage, other chemical storage
Defense Industry Contractors	Staff support services to military installation
Postal or Shipping	USPS offices, FedEx, UPS, others
Critical Manufacturing	Manufacturing critical to local economy
Monuments and Icons	Historical buildings, natural features, local icons
Places of Assembly	Churches, public squares

Within the City of Colorado Springs, or close proximity, there are hundreds of critical facilities for which the city maintains a database. The following table summarizes the number of critical facilities for the City of Colorado Springs according to city GIS data. Table 4-56 lists the number of critical facilities according to Colorado Springs data.

[24] National Bridge Inventory, http://www.fhwa.dot.gov/bridge/nbi/county09.cfm#co, accessed on December 2, 2009.

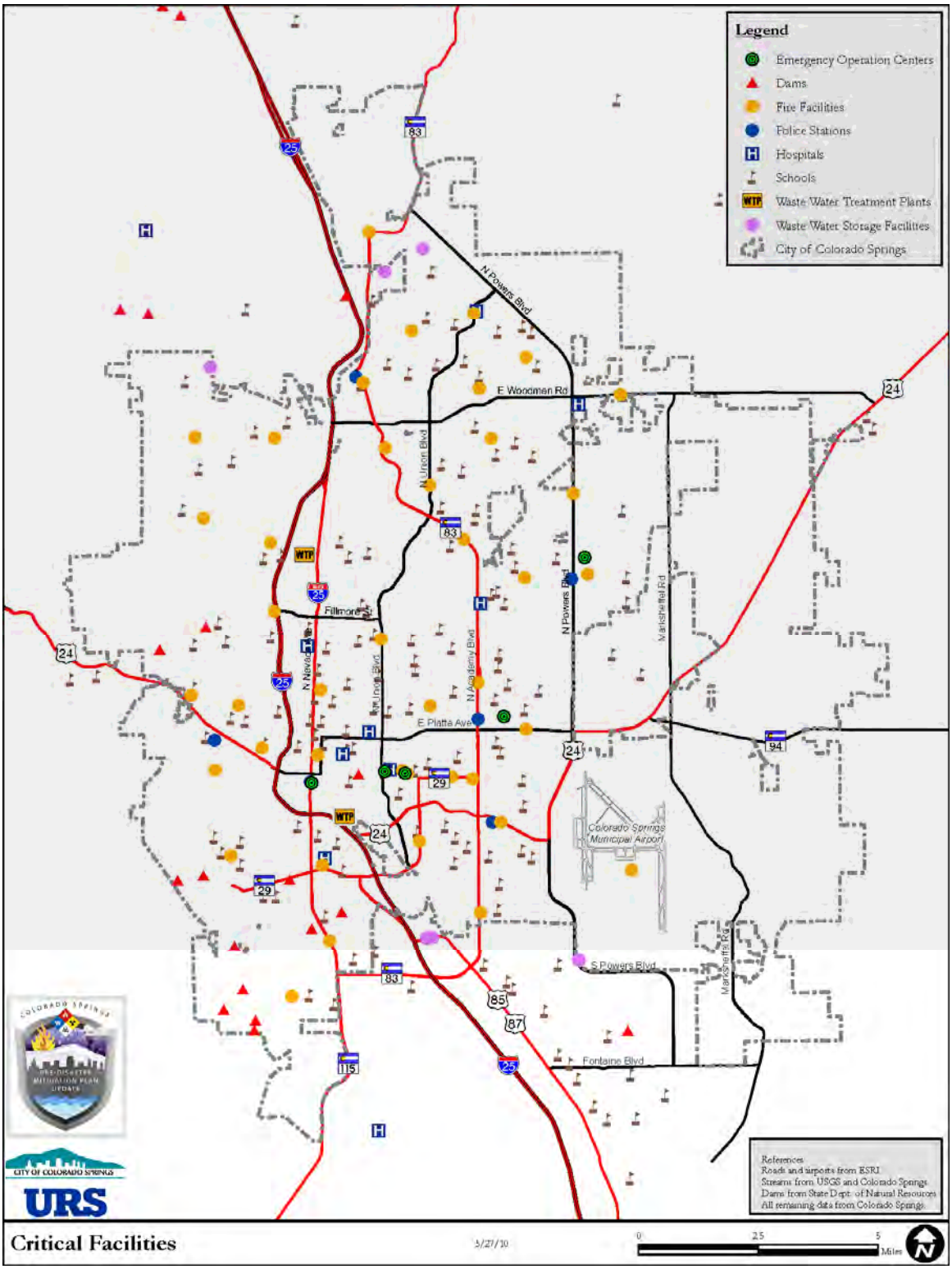
Table 4-56: Critical Facilities in Colorado Springs

Type of Facility	Total Number of Facilities
Police Stations	6
Fire Facilities	41
EOCs	5
Hospitals	10
Schools	163
Dams (that could affect city)	33
Major Bridges	208
Communication Towers	63 (sometimes outside of city limits but within 5 miles)
City Buildings	1,884 (not all essential)
Wastewater Treatment Facilities	2
Wastewater Storage Facilities	9
Public Airports	1

Source: City of Colorado Springs, GIS data

In addition to these critical facilities, there are hundreds of miles of roads, overhead transmission lines, and water and sewer lines, several military installations, churches, minor bridges, and other facilities that are critical to the functionality of the City of Colorado Springs.

Figure 4-68: Critical Facilities in Colorado Springs



Natural, Historic, and Cultural Assets

Assessing the vulnerability of Colorado Springs to disaster also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing this ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources: Wetlands and Endangered Species

Natural resources are important to include in a benefit-cost analyses for future projects. They may be used to leverage additional funding for projects that contribute to other community goals as well. A number of natural resources exist in Colorado Springs. The discussion below comes from data regarding wetlands and endangered species in El Paso County.

Wetlands are a valuable natural resource for communities, due to their ability to improve water quality, wildlife protection, recreation, and education, and play an important role in hazard mitigation. Wetlands reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water. Wetlands also provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation are vital.

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

According to the U.S. Fish and Wildlife Service, as of February 2008, there were 11 Federal endangered, threatened, or candidate species in El Paso County. These species are listed in the following table.

Table 4-57: List of Rare Species in El Paso County

Common Name	Scientific Name	Type of Species	Status
Arkansas darter	*Etheostoma cragini*	Fish	Candidate
Black-footed ferret	*Mustela nigripes*	Mammal	Endangered
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	Fish	Threatened
Gunnison's prarie dog	*Cynomys gunnisoni*	Mammal	Candidate
Least tern (interior population)	*Sternula antillarum*	Bird	Endangered
Mexican spotted owl	*Strix occidentalis lucida*	Bird	Threatened
Pallid sturgeon	*Scaphirhynchus albus*	Fish	Endangered
Piping plover	*Charadrius melodus*	Bird	Threatened
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Mammal	Threatened
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	Flora	Threatened
Whooping crane	*Grus americana*	Bird	Endangered

Source: Endangered, Threatened, Proposed and Candidate Species Colorado Counties (August 2009), U.S. Fish and Wildlife Service Mountain-Prairie Region, www.fws.gov/mountain-prairie/endspp/.

Historical and Cultural Resources

National and state historic inventories were reviewed to identify historic and cultural assets in Colorado Springs. The National Register of Historic Places is the nation's official list of cultural resources worthy of preservation. The Colorado State Register of Historic Properties is a listing of the state's significant cultural resources worthy of preservation for the future education and enjoyment of Colorado's residents and visitors. Table 4-58 lists the properties in Colorado Springs that are on the Colorado State Register of Historic Properties. Those properties that are also on the National Register of Historic Places are indicated with an asterisk.

Table 4-58: Colorado Springs Historic Properties/Districts in State and National Registers

	Property Name	Location	Date Listed
1	ALAMO HOTEL	128 Tejon St.	9/14/77
2	ALL SOULS UNITARIAN CHURCH	730 N. Tejon St.	8/30/07
3	ATCHISON, TOPEKA & SANTA FE DEPOT	555 E. Pikes Peak Ave.	9/10/79
4	BEMIS HALL	920 N. Cascade Ave.	3/28/97
5	BEMIS HOUSE/HEARTHSTONE INN	506 N. Cascade	9/14/79
6	BOULDER CRESCENT PLACE HISTORIC DISTRICT	9 & 11 W. Boulder; 312,318, 320 N. Cascade	9/10/87
7	BURGESS HOUSE	730 N. Nevada Ave.	9/13/90
8	CARLTON HOUSE	US Air Force Academy, Pine Valley	11/3/89
9	CHAMBERS RANCH/WHITE HOUSE (Rock Ledge Ranch)	3202 Chambers Way	11/29/79
10	CITY HALL OF COLORADO CITY	2902 W. Colorado Ave.	6/3/82
11	CLAREMONT/TRIANON (The Colorado Springs School)	21 Broadmoor Ave.	4/13/77
12	COLORADO SCHOOL FOR THE DEAF AND BLIND	33 N. Institute St.	3/11/98
13	COLORADO SPRINGS & CRIPPLE CREEK DISTRICT RAILWAY/CORLEY MTN. HWY.	US Forest Service Rd. 370	3/25/1999
14	COLORADO SPRINGS CITY AUDITORIUM	231 E. Kiowa St.	11/7/95

	Property Name	Location	Date Listed
15	COLORADO SPRINGS CITY HALL	107 Nevada Ave.	2/19/02
16	COLORADO SPRINGS DAY NURSERY	104 E. Rio Grande St.	2/23/90
17	COLORADO SPRINGS FINE ARTS CENTER	30 W. Dale St.	7/3/86
18	COLORADO SPRINGS & INTERURBAN CAR NO. 59	Rock Island Roundhouse	11/9/94
19	COLORADO SPRINGS POST OFFICE & FEDERAL COURTHOUSE	210 Pikes Peak Ave.	1/22/86
20	COLORADO SPRINGS PUBLIC LIBRARY/CARNEGIE BUILDING	21 W. Kiowa St.	11/1/96
21	COSSITT MEMORIAL HALL	906 N. Cascade Ave., Colorado College Campus	3/28/97
22	COTTONWOOD CREEK BRIDGE	On Vincent Dr. over Cottonwood Creek	10/12/01
23	CUTLER HALL	912 N. Cascade Ave., Colorado College Campus	7/3/86
24	DE GRAFF BUILDING	116-118 N. Tejon	8/18/83
25	DICK-TRAPP HOUSE	714 S. Nevada Ave	2/22/07
26	EDGEPLAIN	1106 N. Nevada Ave., Colorado College Campus	11/21/06
27	EL PASO COUNTY COURTHOUSE (Pioneers Museum)	215 S. Tejon	9/29/72
28	EL POMAR ESTATE	1661 Mesa Ave.	11/22/95
29	EMMANUEL PRESBYTERIAN CHURCH	419 Mesa Rd.	5/17/84
30	EVERGREEN CEMETERY	1005 S. Hancock Ave.	2/11/93
31	F. C. AUSTIN MANUFACTURING COMPANY SPRINKLER WAGON	Rock Ledge Ranch	3/8/2000
32	FIRST BAPTIST CHURCH OF COLORDO CITY (Old Colorado City History Center)	1 S. 24th St.	6/14/95
33	FIRST CONGREGATIONAL CHURCH	20 E. Vrain St.	10/31/2002
34	FIRST LUTHERAN CHURCH	301 E. Platte Ave.	7/13/1994
35	GIDDINGS BUILDING	101 N. Tejon St.	4/21/83
36	GLEN EYRIE	3820 N. 30th	4/21/75
37	GWYNNE-LOVE HOUSE	730 N. Casacade Ave.	2/5/87
38	HAGERMAN MANSION	610 N. Cascade Ave.	9/20/84
39	HERSCHELL IDEAL TWO-ABREAST CAROUSEL (Cheyenne Mountain Zoo Carousel)	4250 Cheyenne Mountain Zoo Rd.	9/10/97
40	JACKSON HOUSE	1029 N. Nevada Ave., Colorado College Campus	12/8/99
41	LENNOX HOUSE*	1001 N. Nevada Ave., Colorado College Campus	8/11/99 10/21/99
42	LOWELL ELEMENTARY SCHOOL	831 S. Nevada Ave.	3/8/95
43	MAYTAG AIRCRAFT BUILDING*	701 South Cascade Ave.	12/16/05 1/16/08
44	McALLISTER HOUSE	423 N. Cascade Ave.	8/14/1973
45	McGREGOR HALL	930 N. Cascade Ave., Colorado College Campus	1/27/2000
46	CLARK MELLEN APARTMENTS	218-232½ E. Fountain Blvd.	8/11/1993
47	MIDLAND TERMINAL RAILROAD ROUNDHOUSE (Van Briggle Art Pottery)	600 S. 21st St.	7/10/1979
48	MONTGOMERY HALL	1030 N. Cascade Ave., Colorado College campus	9/13/1990

	Property Name	Location	Date Listed
49	MONUMENT VALLEY PARK	Approximately bounded by Monroe, Culebra, Westview and Bejou Sts., the BNSF railroad tracks, and the west edge of the north-south trail, north of Del Norte	1/25/2007
50	NAVAJO HOGAN	2817 N. Nevada Ave.	9/13/90
51	NORTH END HISTORIC DISTRICT	Bounded by Monument Valley, Wood, Nevada, Madison & Uintah Sts.	12/17/1982
52	NORTH WEBER STREET-WAHSATCH AVENUE RESIDENTIAL DISTRICT	N. Weber Between Boulder & Del Norte	2/8/1985
53	OLD COLORADO CITY HISTORIC COMMERCIAL DISTRICT	North side of Colorado Ave. from 24th St. to 2611 Colorado Avenue, also includes 115 S. 26th St. and 2418 W. Pikes Peak Ave.	11/2/1982
54	ORIGINAL COLORADO SPRINGS MUNICIPAL AIRPORT (Peterson Air & Space Museum)	150 E. Ent Ave. Peterson Air Force Base, Colorado Springs	11/15/1996
55	PALMER HALL	116 E. San Rafael St., Colorado College campus	7/3/1986
56	PAULINE CHAPEL	2 Park Ave.	2/26/2001
57	PIKES PEAK*	Pike National Forest, 15 miles west of Colorado Springs	7/4/1961 10/15/1966
58	PIONEER CABIN	U.S. Air Force Academy	1/27/1975
59	PLAZA HOTEL	830 N. Tejon St.	9/1/1983
60	PONDEROSA LODGE	La Foret Conference and Retreat Center 6145 Shoup Rd., Colorado Springs vicinity	8/29/2008
61	REYNOLDS RANCH	225 N. Gate Rd., Colorado Springs vicinity	9/10/1997
62	IDA M. RICE HOUSE	1196 N. Cascade Ave., Colorado College Campus	11/21/2006
63	RIO GRANDE ENGINE NO. 168	9 S. Sierra Madre	8/10/1979
64	SECOND MIDLAND SCHOOL / OLD MIDLAND SCHOOL	815 S. 25th St.	9/12/1980
65	SHOVE MEMORIAL CHAPEL	1010 N. Nevada Ave., Colorado College	5/22/2005
66	SHRINE OF THE SUN (Will Rogers Shrine)	4250 Cheyenne Mountain Zoo Rd.	11/3/1994
67	ST. MARY'S CATHOLIC CHURCH	26 W. Kiowa	6/3/1982
68	STOCKBRIDGE HOUSE (Amarillo Motel)	2801 W. Colorado Ave.	9/11/1980
69	TAYLOR MEMORIAL CHAPEL	6145 Shoup Rd., Colorado Springs vicinity	4/15/1999
70	TICKNOR HALL	926 N. Cascade Ave., Colorado College Campus	1/27/2000
71	UNITED STATES AIR FORCE ACADEMY, CADET AREA	Roughly between Cadet Dr. and Faculty Dr., U.S. Air Force Academy	4/1/2004
72	YWCA BUILDING / COLORADO SPRINGS COMPANY	130 E. Kiowa St.	9/10/1979

Source: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/
*On both the Colorado State Register of Historic Properties and the National Register of Historic Places.

Other Cultural Resources in Colorado Springs and Vicinity[25]

- Cheyenne Mountain Zoo
- The Broadmoor Hotel
- The Flying W Ranch
- Garden of the Gods
- US Olympic Complex
- US Air Force Academy
- Pro Rodeo Hall of Fame
- Will Rogers Shrine of the Sun
- Colorado Springs Fine Arts Center
- Ghost Town Museum
- Western Museum of Mining and Industry
- Seven Falls
- Sertich Ice Center
- World Arena
- Fort Carson
- Penrose Fountain at America the Beautiful Park (shown below)

Figure 4-69: Penrose Fountain at America the Beautiful Park[26]

[25] Yahoo Travel Site, online at http://travel.yahoo.com/p-travelguide-2816507-colorado_springs_things_to_do-i, accessed on January 29, 2010.
[26] Google image search, online at http://3.bp.blogspot.com/_KpJl5zaeXS8/SfW35XT27CI/AAAAAAAAD9E/cyrdmhF3zUo/s800/Penrose+Fountain+hdr+1.jpg accessed on January 29, 2010, photo by Jules Vigil.

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as retail trade or health care, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major employers are unable to return to normal operations, impacts ripple throughout the community. Table 4-59 lists the top employers in Colorado Springs (over 1,000 employees). This data was extracted from the Colorado Department of Labor and Employment, and may or may not reflect current values. Other major military installations such as Fort Carson and NORAD are also considered top employers for the Colorado Springs area.

Table 4-59: Top Employers in Colorado Springs (Over 1,000 Employees)

Name
Agilent Technologies
Atmel Corp.
Broadmoor – Colorado Springs
Colorado Springs District 11
Focus on the Family
Front Range Emergency Specs
Hewlett-Packard
Martin Senour Paints
Memorial Hospital
Penrose St. Francis Hospital
Peterson Air Force Base
Schriever Air Force Base
Verizon

Source: Colorado Department of Labor and Employment http://lmigateway.coworkforce.com/, accessed on March 24, 2010.

Table 4-60, below, describes the labor force, employment and unemployment information for Colorado Springs MSA from November 2009 data.

Table 4-60: Labor Force Statistics for the Colorado Springs MSA

Area	Civilian Labor Force	Number Employed	Number Unemployed	Unemployment Rate
Colorado Springs MSA	303,439	281,503	21,936	8.9%
Colorado	2,664,937	2,485,850	179,087	6.7%

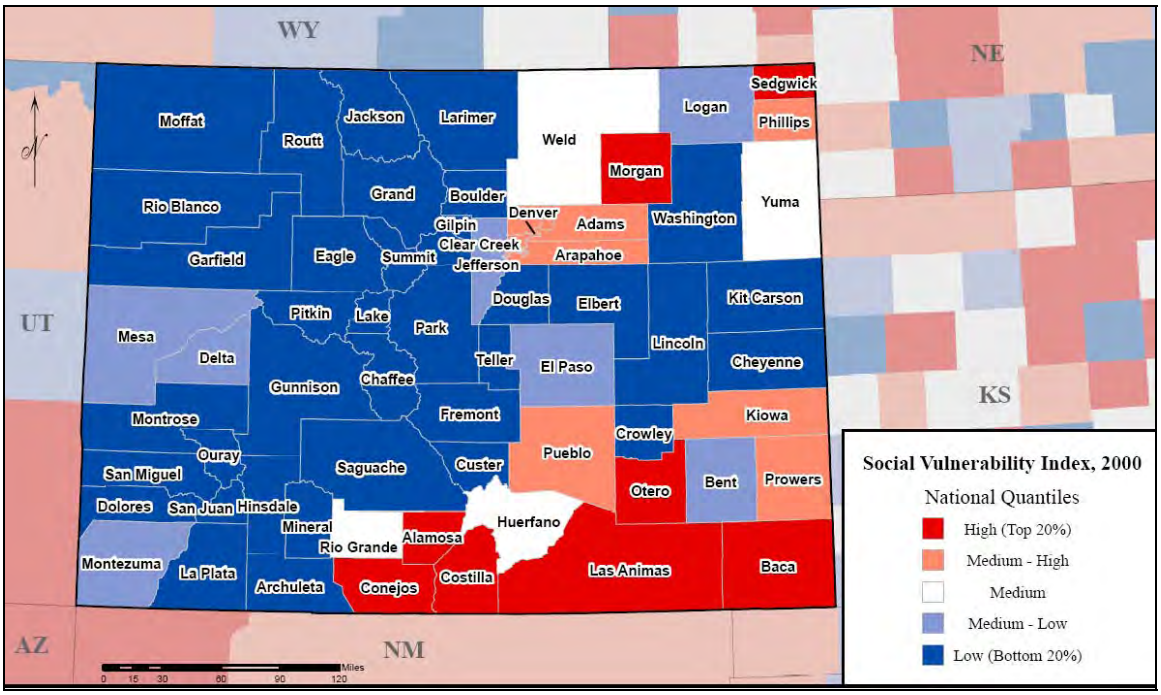
Source: State of Colorado Department of Labor and Employment, http://lmigateway.coworkforce.com/lmigateway/, accessed on January 18, 2010.

4.16 Social Vulnerability

Certain demographic and housing characteristics affect overall vulnerability to hazards. These characteristics, such as age, race/ethnicity, income levels, gender, building quality, public infrastructure, all contribute to social vulnerability.

A Social Vulnerability Index compiled by the Hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina measures the social vulnerability of U.S. counties to environmental hazards for the purpose of examining the differences in social vulnerability among counties. Based on national data sources, primarily the 2000 Census, it synthesizes 42 socioeconomic and built environment variables that research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. Eleven composite factors were identified that differentiate counties according to their relative level of social vulnerability: personal wealth, age, density of the built environment, single-sector economic dependence, housing stock and tenancy, race (African American and Asian), ethnicity (Hispanic and Native American), occupation, and infrastructure dependence. Figure 4-70, below, illustrates Colorado counties compared to the national average.

Figure 4-70: Social Vulnerability by County Compared with the Nation



Source: The Hazards and Vulnerability Research Institute, http://webra.cas.sc.edu/hvri/products/sovi.aspx, accessed on December 3, 2009.

Compared to other counties in the nation and in Colorado, El Paso County's social vulnerability is medium-low, meaning that compared to other counties in the nation, El Paso County is considered to be less socially vulnerable than most, but not within

the 20 percent least vulnerable.[27] To better understand the characteristics behind this ranking, the Subcommittee researched information from the 2000 Census on four factors of social vulnerability: gender, age, language spoken in home, and poverty. One characteristic of social vulnerability is differential access to resources and greater susceptibility to hazards. All factors considered here are related to this characteristic. Table 4-61 displays these variables and compares them to the same variables for Colorado and the United States. These factors of social vulnerability hold many implications for disaster response and recovery and are important considerations when identifying and prioritizing mitigation actions and overall goals of the Plan.

Table 4-61: Social Vulnerability from 2000 U.S. Census

Jurisdiction	Total Population	Total Housing Units	% Female	% Under Age 18	% Age 65 and Over	% Speak Language Other than English in Home*	% Individuals Below Poverty Level*
United States	281,421,906	115,904,641	50.9	25.7	12.4	17.9	12.4
Colorado	4,301,261	1,808,037	49.6	25.6	9.7	15.1	9.3
City of Colorado Springs	360,890	148,690	50.5	26.5	9.6	11.7	8.7

Source: 2000 Census, U.S. Census Bureau *Based on sample data. The Census Bureau uses a set of money income thresholds that vary by family size and composition to determine the percentage of the population in poverty.

Age

Age can affect the ability of individuals to move out of harm's way. The Subcommittee analyzed two variables for age: percentage of population over 65, and percentage under age 18. At 26.5 percent, the percentage of Colorado Spring's population under 18 is about five percent lower than Colorado as a whole, and the percentage over age 65 is nearly equal to that of Colorado as a whole.

Language Spoken in Home

The language spoken in the home can signify language and cultural barriers that affect communication of warning information and access to post-disaster information. In Colorado Springs, 11.7 percent of the population speaks a language other than English in the home. This is below both the U.S. (17.9) and Colorado (15.1) percentages. The language spoken in the home is not likely to increase social vulnerability in the planning area but should still be considered by the City in regard to communication efforts.

Poverty

Wealth and poverty also are indicators of social vulnerability. Low income and impoverished populations have fewer resources available for recovery and are more likely to live in structures of greater physical vulnerability. They also typically have limited access to transportation, less ability to prepare for disasters (with extra supplies, preparedness kits), and limited resources for

[27] http://webra.cas.sc.edu/hvriapps/SOVI_Access/SoVI_Access_Page.htm, accessed November 2009.

recovering from displacement. Individuals and communities with greater wealth have more ability to absorb losses and be resilient in the face of disaster due to factors such as insurance and social safety nets. They also have greater capabilities to mitigate hazards and greater access to funds for recovery.

To compare wealth and poverty, the Subcommittee analyzed the percentage of individuals below the poverty level in Colorado Springs. Overall, Colorado Spring's percentage of individuals living below the poverty level (8.7) is lower than that of the nation (12.4) and slightly lower than Colorado (9.3).

4.17 Land Use and Development Trends

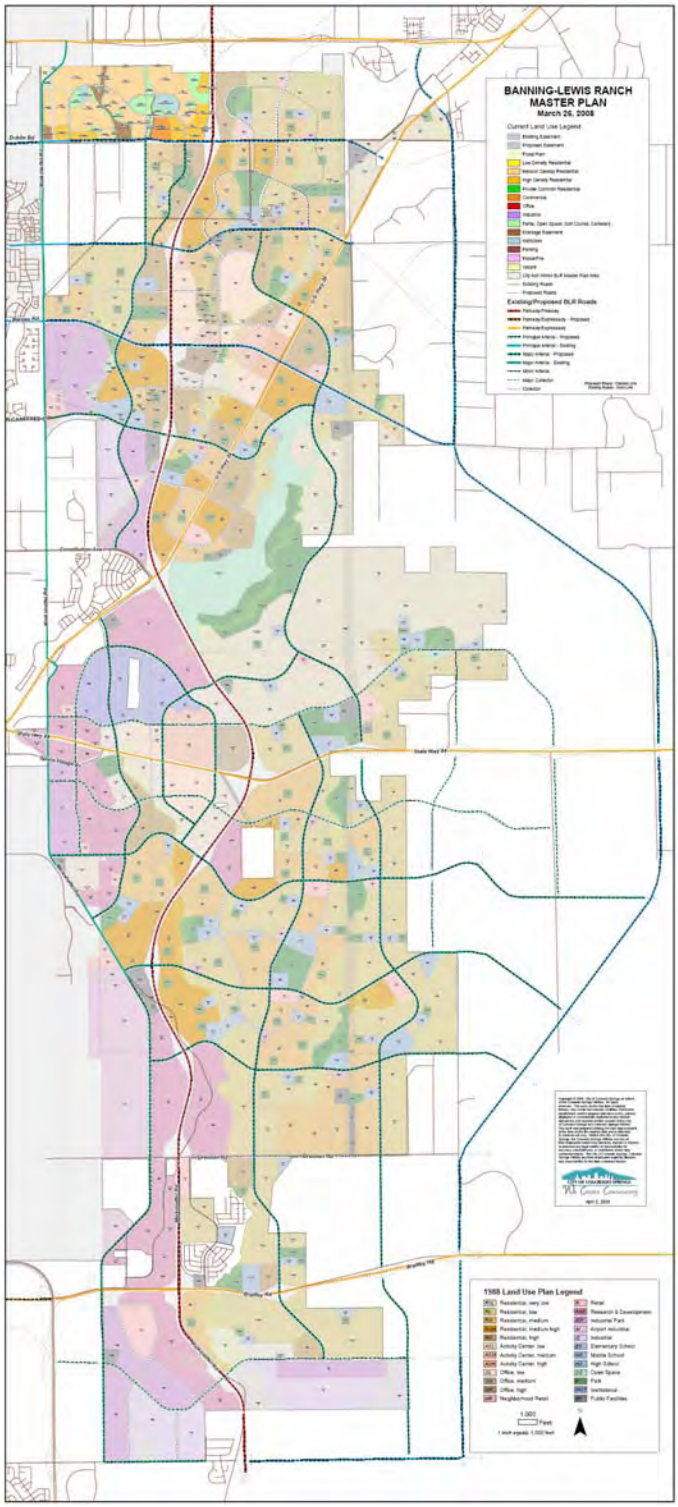
This section provides a general description of land uses and development trends within the City of Colorado Springs and includes data on growth in population and housing units. The 2005 PDMP described that future growth would primarily occur to the north and northeast. This is still true, yet this Plan update expands on that concept by including demographic data projections and identifying key redevelopment areas through urban renewal.

The long-term growth potential for the city will be primarily to the east of current development. The Banning Lewis Ranch development contains approximately 24,500 acres which can accommodate considerable long-term growth. It was the largest single annexation in the area's history. This area has been master planned since 1988 and development is currently starting along the northern portion of the ranch property. Figure 4-71 illustrates the proposed land uses for Banning Lewis Ranch. The JL Ranch property, located in the southwest portion of the city, is one of the last remaining large parcels on the west side of the City yet to develop which has considerable hillside characteristics. It is anticipated that this property will develop once the economy improves.

Infill and redevelopment is anticipated to continue citywide. Several large parcels exist in various areas of the city that have considerable vacant acreage associated with them. Development of these parcels is expected within the near to mid term. Redevelopment pressures will continue within older areas of the city. Areas within the downtown and the along the Nevada corridor have and are experiencing pressures for redevelopment. Figure 4-72 identifies the existing urban renewal areas within the city. These areas may potentially increase the total vulnerability of the city to natural hazards, as redevelopment often brings higher densities.

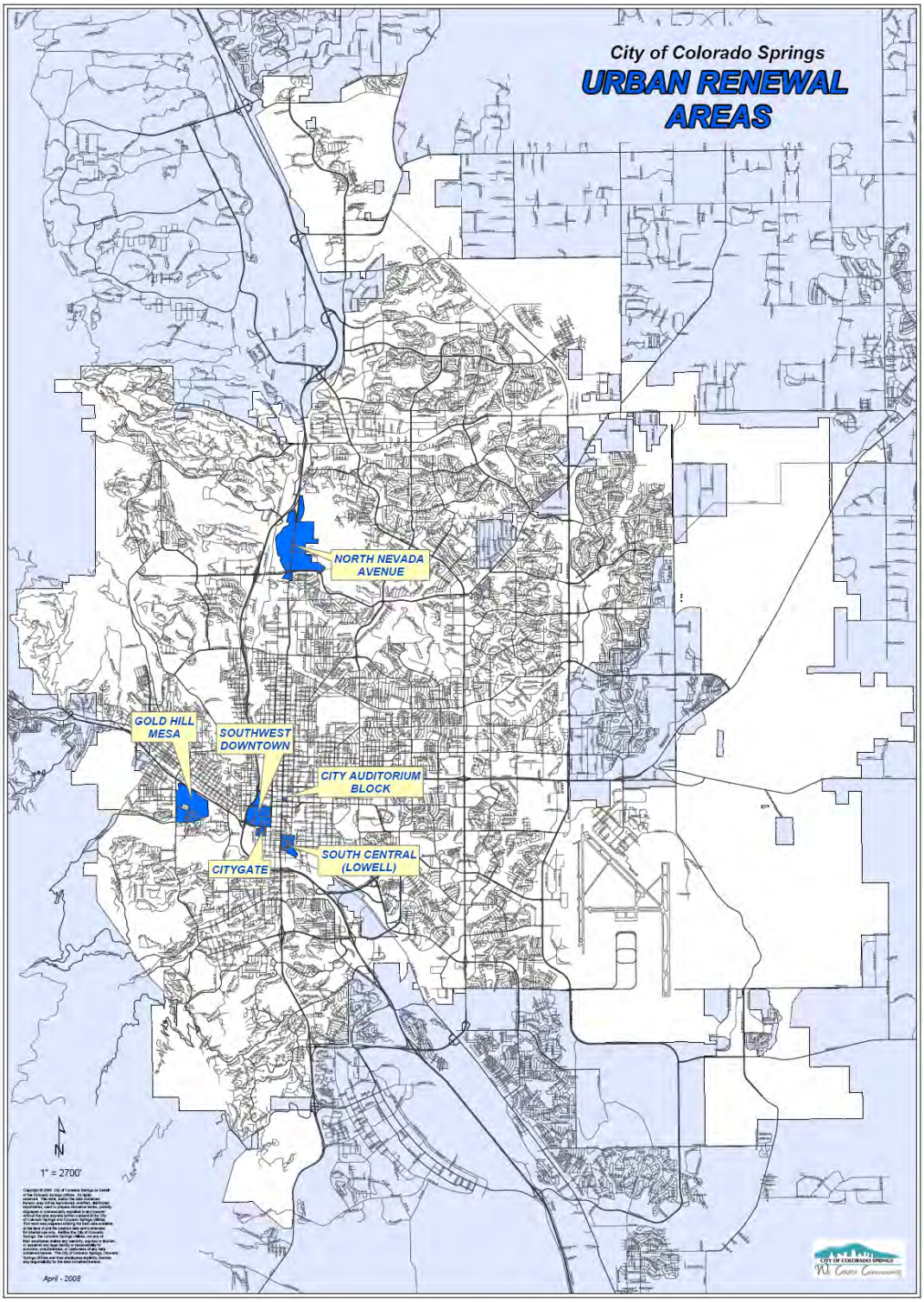
Figure 4-73 shows the 2020 land use map adopted by Colorado Springs City Council in November 2008.

Figure 4-71: Banning Lewis Ranch Master Plan Map



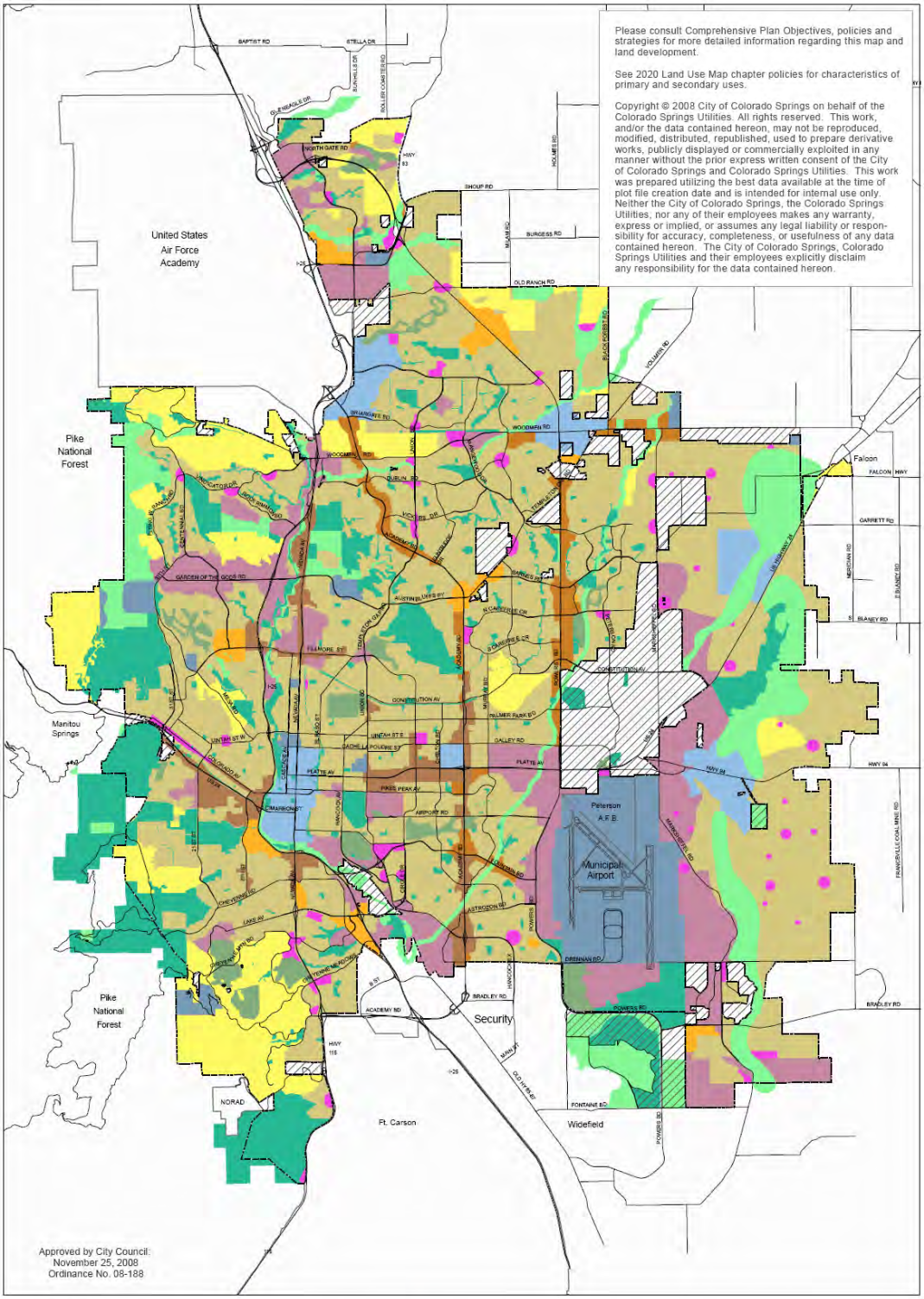
Source: Colorado Springs Map Gallery, www.springsgov.com, accessed on January 26, 2010.

Figure 4-72: Urban Renewal Areas in Colorado Springs, 2008



Source: City of Colorado Springs, www.springsgov.com, accessed on January 28, 2010.

Figure 4-73: City of Colorado Springs Land Use 2020



Source: City of Colorado Springs, www.springsgov.com, accessed on November 16, 2009.

Table 4-62, Table 4-63, and Table 4-64 provide information on growth in population and housing units for the City of Colorado Springs and El Paso County. Table 4-65 provides population projections for Colorado Springs in 5-year increments to the year 2035.

Table 4-62: Population Growth in Colorado Springs, 2000-2007

Jurisdiction	2000	2007	Percent Change (%)
City of Colorado Springs	360,890	394,177	9.2
El Paso County	516,929	587,590	13.7

Source: Colorado Department of Local Affairs Demography Section, www.dola.colorado.gov/dlg/demog/. 2010

Table 4-63: Growth in Housing Units in Colorado Springs, 2000-2007

Jurisdiction	2000	2007	Percent Change (%)
City of Colorado Springs	148,690	175,731	18.2
El Paso County	202,428	246,074	21.6

Source: Colorado Department of Local Affairs Demography Section, www.dola.colorado.gov/dlg/demog/. 2010

Table 4-64: Population and Housing Unit Density in Colorado Springs, 2000-2007

Jurisdiction	Area in Square Miles	2000 Population Density* (per sq. mile)	2007 Population Density* (per sq. mile)	2000 Housing Unit Density* (per sq. mile)	2007 Housing Unit Density* (per sq. mile)
City of Colorado Springs	195	1,851	2,021	763	901
El Paso County	2,158	240	272	94	114

*Densities rounded to the nearest integer.

Sources: Colorado Department of Local Affairs Demography Section, www.dola.colorado.gov/dlg/demog/; and U.S. Census Bureau, www.census.gov/. 2010

Table 4-65: Population Projections for El Paso County, 2005-2035

	2005	2010	2015	2020	2025	2030	2035
Population	568,424	624,314	673,324	735,428	798,541	861,971	924,997
Percent Change (%)	--	1.9	1.5	1.8	1.7	1.5	1.4

Source: Colorado Department of Local Affairs Demography Section, www.dola.colorado.gov/dlg/demog/, October 2009.

As indicated in the tables above, population growth rates from 2000 to 2007 in the unincorporated portions of El Paso County were greater than within the City of Colorado Springs. The population density in Colorado Springs is estimated at 2,021 per square mile in 2007, more than seven times that of the unincorporated parts of El Paso County. It can be generally stated that should major natural hazards hit the area, the impacted population would typically be greater in the City of Colorado Springs than unincorporated El Paso County. The State Demographers Office projects that the El Paso County population will rise to nearly 930,000 by the year 2035, surpassing any other county in Colorado.

There was a significant increase (18.2%) in the number of housing units in Colorado Springs between 2000 and 2007. That will likely taper off with the 2010 Census data (when available) considering the economic recession continuing from 2008.

4.18 Capability Assessment

A community's regulatory, administrative and technical, and financial capabilities are directly related to the ability of that community to mitigate natural hazards prior to a major event taking place. For instance, a city with a full professional staff of geologic engineers will be well-equipped to provide protection and advice for landslide-prone properties. Conversely, a city without building codes may not have the leverage necessary to protect the welfare of individuals and property during a major wind event. Following is a list of the City of Colorado Springs capabilities that foster hazard mitigation in one way or another.

Regulatory Mitigation Capabilities

Table 4-66: Regulatory Mitigation Capabilities

Capability	
Master or Comprehensive Plan	YES
Emergency Operations Plan	YES
Economic Development Plan	YES
Capital Improvements Plan	YES
Community Wildfire Protection Plan	YES
Building Code	YES
Building Code Year	2003
Floodplain Ordinance	YES
Zoning Ordinance	YES
Subdivision Ordinance	YES
Stormwater Ordinance	YES
Growth Management Ordinance	Boundary
Site Plan Review Requirements	YES
Erosion/Sediment Control Program	YES
Stormwater Management Program	YES
National Flood Insurance Program Participant	YES
Community Rating System Participant	YES

Several policies and procedures from Colorado Springs' existing regulations, plans, and studies are related to natural hazard mitigation. The following tables summarize those policies.

Table 4-67: City of Colorado Springs Comprehensive Plan Policies

7.1.104 Areas of Consideration – Comprehensive plan procedures
B. Existing natural conditions shall be used to the extent possible in determining the type, density and intensity of public and private development of land within the planning jurisdiction of the City.
Chapter 5 - Natural Environment
Policy NE 201: Identify, Evaluate and Incorporate Significant Natural Features Preserve the variety of spectacular natural features, so prevalent in and around the City, for the enjoyment of residents and visitors. Incorporate significant natural features on individual sites into the design of new development and redevelopment. Identify and inventory natural features through best management practices prior to incorporating features into site planning. Include significant natural features that contribute to the attractiveness of the community such as ridgelines, bluffs, rock

outcroppings, view corridors, foothills, mountain backdrop, urban forest, floodplains, natural water bodies, clean air, natural drainageways and wildlife habitats.
Strategy NE 202b: Collaborate on Watershed Management Develop a comprehensive watershed management program for all watersheds in conjunction with other regional jurisdictions.
Strategy NE 202c: Drainage Way Protection Protect riparian areas and natural water bodies on public and private lands as natural drainage ways and ecosystems through land use plans, development plans, best management practices and ordinances. Update Drainage Basin Planning Studies and the development review process to require mitigation plans for development or modifications to existing utilities on lands with natural drainage ways.
Policy NE 203: Manage and Enhance the Urban Forest Manage the city's urban forest to ensure an abundance of healthy and attractive trees, including parklands and street trees. Recognize that the diversity of tree species provides many benefits, including improving air quality, reducing noise levels, providing wildlife habitat, and adding to the aesthetics and overall quality of life in the community. Preserve, promote, and enlarge the urban forest to enhance air quality, wildlife habitat, and community aesthetics and overall quality of life; abate noise; and reduce flood damage. Manage potential fuel problems and development practices to reduce forest fire risk.
Strategy NE 203a: Enhance Community Awareness Enhance community awareness about the importance of the urban forest and the positive impact trees have upon the environment. Develop a Wildfire Management Program to address impacts of the wildland/urban interface.
Strategy NE 204a: Monitor the City's Hillside Ordinance Monitor the provisions of the Hillside Ordinance to protect the environmental conditions of hillside areas and adjust such provisions as appropriate so that the hillsides and ridgelines are protected.
Objective NE 3: Minimize Environmental Hazards and Constraints Take into account natural and man-made hazards and the appropriate relationship between the natural and built environment in all planning, policy, and development decisions. Minimize impacts from natural and man-made hazards to protect citizens, property, and the environment. The city, county, and other appropriate governmental agencies will cooperatively develop plans, programs, regulations, and incentives to reduce the impacts from natural and man-made hazards.
Policy NE 301: Develop Plans and Regulations Develop plans and regulations to protect environmental quality and important ecological functions and minimize hazards to health and property through development reviews and implementation of plans and ordinances addressing environmental hazards and constraints.
Strategy NE 301a: Refine Plans and Regulations Continually refine plans and regulations to address floodplains, streams/drainageways, hillsides and geologic hazards and ensure consistency between these planning and implementation tools.
Strategy NE 301b: Master Plans to be Consistent with Drainage Basin Plans Ensure that all individual master plans are consistent with the Drainage Basin Planning Studies. Update existing master plans as development review is requested. Foster cooperation between the city and property owners to ensure that individual master plans are consistent with the Drainage Basin Planning Studies and the Comprehensive Plan policies and land use maps or require an amendment to these City Plans.
Strategy NE 301c: Carefully Site Infrastructure in Hazard and Constrained Areas Recognize and avoid, whenever possible, geologic hazard and constrained areas in the placement of infrastructure. If this is not possible, siting of facilities and necessary access will minimize their impact and maximize restoration of disturbed areas. Revise subdivision and development standards to provide greater flexibility in the placement of infrastructure in and around environmentally sensitive areas. Include a protection and mitigation plan in all proposals for development on sites containing geologic hazards and constrained areas.
Strategy NE 301d: Mitigate Identified Hazards Develop and use mitigation plans to minimize risk to life and property by structural and non-structural design or modification of actions. Use mitigation plans where it is not otherwise practical to place structures or human activities outside of these hazard areas. Discourage new development in delineated hazard areas.
Policy NE 302: Protect Drainageway and Floodplains Limit development of land within floodplains, which should remain, or be returned, to its natural state. Development can reduce a floodplain's ability to store and convey water, intensifying velocity and depth of floodwater in other areas. Areas subject to significant flooding also pose a threat to citizens and property. Floodplains are lands identified in the Streamside Overlay Zone and FEMA designations.
Strategy NE 302a: Use Drainage Basin Planning Studies for Stormwater Management Use the established method of drainage treatment for a particular Drainage Basin Planning Study for all proposed development

or redevelopment, or require an amendment to the Study if changes are proposed or required. Use Best Management Practices to address erosion, sediment control and stormwater quality during construction and after development. Minimize the adverse impacts of stormwater runoff, including erosion/sedimentation, to drainageways and other drainage facilities. Plan and utilize floodplains and drainageways as greenways for multiple uses including conveyance of runoff, wetlands, habitat, trails, recreational uses, utilities and access roads when feasible, considering the primary intended use.
Strategy NE 302b: Retain Floodplains in their Natural State. Floodplains will remain as undisturbed riparian corridors, wildlife habitat, or wetlands whenever possible. Trails or other open recreational facilities and utility facilities such as electric, gas, and water mains may be appropriate in certain areas. Identify these areas in master plans, development plans and development proposals.
Strategy NE 302c: Flood Damaged Property Will not be Permitted to Rebuild Compliance with FEMA requirements is required for all properties within high flood hazard areas. Any structural rebuilding must minimize the potential for sustaining future damage. Do not grant a building permit for expansion to properties prone to damage by flooding. Prepare a plan for property acquisition of flood-damaged property and undevelopable land in high flood hazard areas. Permit rebuilding or expansion as appropriate only for necessary utility infrastructure such as electric, gas, and water mains or other public infrastructure.
Policy NE 303: Avoid or Mitigate Effects of Geologic Hazards Undertake efforts through the development review process to substantially reduce adverse consequences of development by recognizing and appropriately addressing geologic processes. Discourage development in potentially hazardous areas associated with hillside and geologic development constraints, including steep slopes, erosion, unstable soil, subsidence, coal hazards or similar development constraints.
Strategy NE 303a: Identify Geologic Hazards Carefully delineate geologic and coal hazards and determine appropriate locations for development through the development review process.
Strategy NE 303b: Monitor the City's Geologic Hazard Ordinance Monitor the provisions of the Geologic Hazard Ordinance to protect the environmental conditions within geologic hazard areas and adjust them as appropriate so those geologic hazards are mitigated.

Table 4-68: Subdivision Regulations related to Natural Hazard Mitigation

7.7.609: HILLSIDE DEVELOPMENT:
A monitored smoke alarm system or a sprinkler system shall be required for all new homes on lots with lot lines that are more than one thousand feet (1,000') from the entrance of a cul-de-sac or lie on or beyond roadways with grades in excess of ten percent (10%), if those roadways are the only points of vehicular access. These lots shall be identified on the subdivision plat. This requirement shall not apply to subdivision plats recorded prior to March 24, 1981, or to subdivisions for which a development plan was approved prior to April 1, 1993. (Ord. 96-44; Ord. 01-42)
7.7.901: PURPOSE: (Part 9 Subdivision Drainage Facilities)
A. The City Council hereby finds, determines and declares the urgent necessity of providing storm drains and other facilities for the drainage and control of flood and surface waters including facilities or best management practices (BMPs) to control stormwater quality within areas and territories to be subdivided and developed and the City Council further finds and declares that the facilities are required for the proper and orderly development of the areas and territories in order that storm and surface waters may be properly drained and controlled along with stormwater quality and that the health, property, safety and welfare of the City and its citizens may be safeguarded and protected.

Table 4-69: Zoning Code Regulations related to Natural Hazard Mitigation

Article 4: Site Development Standards
Part 5 – Geologic Hazards Study and Mitigation **7.4.501: PURPOSE:** The purpose of this part is to identify geologic conditions, which may pose hazards to a land development project in order that appropriate mitigation or avoidance techniques may be implemented. The types of geologic hazards to be identified shall include, but not be limited to, the following: A. Expansive soils and expansive rock; B. Unstable or potentially unstable slopes; C. Landslide areas or potential landslide areas; D. Debris fans; E. Rockfall; F. Subsidence; G. Shallow water tables; H. Springs; I. Flood prone areas; J. Collapsing soils; K. Faults; and L. Dipping bedrock. (Ord. 96-74; Ord. 01-42)
Chapter – Article 3 – Part 5: OVERLAY DISTRICTS
7.3.501: PURPOSE: The purposes of this part are to provide a method for applying additional standards and conditions to base zone districts when necessary to ensure compatibility with adjacent land uses, increase design flexibility, protect surrounding areas from negative impacts of new development proposals, preserve outstanding elements of the City's heritage, prevent destruction of the natural and topographic character of hillside areas, prevent loss of life and minimize damage to properties located in or near areas of flood hazard areas, allow development of high rise areas, and promote the public health, safety, and general welfare. The overlay districts are: DFOZ Design flexibility overlay HR High rise overlay HS Hillside area overlay HP Historic preservation overlay AO Airport overlay P Planned provisional overlay SS Streamside overlay zone (Ord. 94-107; Ord. 01-42; Ord. 02-166; Ord. 06-89; Ord. 09-70)
Chapter 7 – Article 8: Floodplain Management
7.8.101: FLOODPLAIN MANAGEMENT: Floodplain management within the City shall be in accordance with section RBC 313 of the Building Code. (Ord. 96-44; Ord. 01-42; Ord. 05-135)

Administrative and Technical Capabilities

Table 4-70: Administrative and Technical Capabilities

Administrative/ Technical Resources	
Planner/ Engineer with knowledge of land development practices	YES
Engineer/ Professional trained in construction practices related to buildings/ infrastructure	YES
Planner/ Engineer/ Scientists with understanding of natural hazards	YES
GIS capabilities	YES
Full-time building official	YES
Floodplain administrator	YES
Emergency manager	YES
Grant writer	YES
Warning Systems/ Services	YES

Fiscal Mitigation Capabilities

Table 4-71: Fiscal Mitigation Capabilities

Financial Resources	
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 (with vote)
Incur debt through special tax bonds	YES (with vote)

Mitigation Outreach and Partnerships

The City of Colorado Springs is currently providing several public and private outreach programs aimed at natural hazard mitigation and risk reduction. Many of these programs were in place during the 2005 PDMP.

Community Wildfire Protection Plan, 2010: The City of Colorado Springs Fire Department is drafting the CWPP 2010 for adoption sometime in 2010. The plan focuses on "Sharing the Responsibility."

Water Conservation Plan: Colorado Springs Utilities recently adopted the Water Conservation Plan 2008-2012 which outlines future needs assessment and conservation strategies.

Vulnerable Populations Analysis 2010: The City of Colorado Springs Office of Emergency Management is currently drafting a vulnerable population needs assessment targeted for adoption sometime in 2010.

Xeriscape Educational Program: Colorado Springs Utilities actively educates the public on xeriscaping in the dry climate. There are both online and classroom opportunities.

Silver Key Senior Services: Silver Key provides nutritional, transportation, and independent living services to elderly populations in the City of Colorado Springs. In the event of a natural hazard event, their services are crucial.

Citizen Emergency Response Training (CERT): The City of Colorado Springs Office of Emergency Management offers training courses that prepare the citizenry for natural disasters and other events.

StormReady Community: The City of Colorado Springs is recognized as a StormReady Community by the National Weather Service. This program encourages the proactive planning for major weather events and improving hazardous weather operations.

Wildland Fire Risk Program: The City of Colorado Springs Fire Department provides an online resource for citizens to understand their individual risk to wildfire, and provides information on reducing the risks to damages associated with wildfire.

Community Services Section – CSFD: The Community Services Section of the Colorado Springs Fire Department is dedicated to education efforts that ensure a safe community including life safety programs and business community outreach, amongst others.

Ditch Playing in Ditches Program – Stormwater Engineering: The City of Colorado Springs Stormwater Engineering Department developed this interactive educational program centered on the dangers of flash flooding in Colorado Springs. Teachers, students, and parents learn about the dangers of flash flooding through games and other resources.

Floodplain Management and Community Assistance – PPRBD: The Pikes Peak Regional Building Department issues informational flyers and serves as the City of Colorado Springs floodplain management agency. PPRBD provides educational pamphlets and reviews development applications in the floodplain.

Additional Emergency Management Education: The Office of Emergency Management made several presentations that accounted for the education of almost 550 people in 2008 alone regarding emergency management.[28]

Pikes Peak Wildfire Prevention Partners: The PPWPP is a not-for-profit interagency task force committed to the prevention and mitigation of wildland fires. The mission of the Pikes Peak Wildfire Prevention Partners is to provide effective reduction of the threat of wildfire to life and property in El Paso, Teller and Douglas counties.[29]

[28] The City of Colorado Springs Office of Emergency Management 2008 Annual Report, http://www.springsgov.com/Page.aspx?NavID=2492, accessed on January 28, 2010.
[29] Colorado State Hazard Mitigation Plan, page 82.

5. Mitigation Strategy

FEMA Requirement

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.

EMAP Standard

Standard 4.4.1: The jurisdiction shall develop and implement a mitigation program to eliminate hazards or mitigate the effects of hazards that cannot be reasonably prevented. The program participates in Federal, state/territorial, tribal and local mitigation programs. The program identifies ongoing mitigation opportunities and tracks repetitive loss. The program implements mitigation projects according to a plan that sets priorities based upon loss reduction. The mitigation process encourages public/private partnerships.

This chapter describes the updated mitigation strategy developed by the Planning Subcommittee based on the risk assessment described in Chapter 4.

Plan Update

The Planning Subcommittee reviewed and revised the 2005 mitigation strategy made up of goals and actions through a collaborative group process at their meetings. The 2010 mitigation strategy consists of the overall strategy statements, goals, objectives, and mitigation actions.

- The **Strategy Statements** are statements that define the Plan's purpose for existence and primary function. These were taken directly from the original 2005 PDM Plan, and are described in section 5.1.
- **Goals** are general guidelines that explain what the plan means to achieve. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. They are meant to be achieved over the long term and typically consist of broad, policy statements. For this Plan Update, the original goals from the 2005 plan were compiled into one meaningful goal.
- **Objectives** are standards that can be reasonably achieved within a certain timeframe. Objectives for the 2010 Plan Update were crafted by dissecting some of the actions in the 2005 plan and developing new objectives.
- **Mitigation Actions** are specific actions designed for implementation that help achieve the goal and objectives. The actions from the original 2005 plan were reviewed and revised as necessary. The Planning Subcommittee found that many of the actions defined in the 2005 plan were written somewhat broadly and could not be definitively accomplished.

The Planning Subcommittee re-worded some actions, eliminated others, and developed new actions for the 2010 Plan Update.

5.1 Plan Strategy Statements, Goals, and Objectives

FEMA Requirement

4 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.

The 2005 plan strategy statements were retained for the 2010 Update. They are as follows:

- Natural disasters are inherent to the geographic area. Natural disasters will continue to occur and affect people, businesses, government functions, and other community activities, functions and processes.
- Pro-active comprehensive preparedness and mitigation programs involving city entities, in partnership with other agencies, other partners and the public is in the best interest of the community by helping to reduce the effects of a disaster as well as reducing the time and resources required for response and recovery.
- The long-term strategy and vision for the city is to sustain successful measures that reduce exposure to future disaster losses and implement other measures that strengthen the disaster preparedness of the community.

At the second meeting on February 16, 2010, the Planning Subcommittee evaluated the five previous plan goals and developed one new goal that provides direction for reducing the impacts of the hazards profiled in the risk assessment.

The goals from the previously approved 2005 plan were the following:

- Recognize and reduce or eliminate the exposure to damage, destruction and other losses from floods.
- Recognize and reduce or eliminate the exposure to damage, destruction and other losses from wildfires.
- Recognize and reduce or eliminate the exposure to damage, destruction and other losses from landslides.
- Recognize and reduce or eliminate the exposure to damage, destruction and other losses from severe weather.
- Recognize and reduce or eliminate the exposure to damage and destruction from other natural disasters not specifically identified in this Plan, which may become a significant problem in the future.

To update the goals, the Planning Subcommittee reviewed the results of the updated risk assessment and the goals and objectives in the Colorado State Natural Hazard Mitigation Plan. The Planning Subcommittee consolidated the goals from the 2005 plan to be more supportive of the comprehensive range of mitigation action types needed to reduce vulnerability. After reviewing and revising goals presented by URS, the Planning Subcommittee came to consensus on the following goal for the 2010 plan update.

GOAL: Reduce or eliminate the exposure to property damage, injury or loss of life, and damage to the natural environment caused by natural hazards.

The 2005 plan did not include objectives. The Planning Subcommittee determined that several actions identified in the 2005 plan were written more like objectives, and as such, the actions could not definitively be accomplished. The Planning Subcommittee carefully reviewed the 2005 mitigation actions and defined the following objectives for the 2010 Plan Update:

Objective A: Identify and initiate improvements to public safety, response, and recovery programs to reduce risk and vulnerability.

Objective B: Follow through with and leverage existing organizations, programs, and procedures to implement the PDM Program.

Objective C: Build upon existing public outreach efforts to reduce risk and vulnerability to natural hazards.

Objective D: Leverage external financial assistance and other resources to strengthen the city's disaster resiliency.

Objective E: Continue to improve the regulatory review process for development and construction in the vicinity of known natural hazard areas.

Objective F: Continue to assess ongoing disaster preparedness programs that maintain or improve city preparedness.

5.2 Identification of Mitigation Action Alternatives

FEMA Requirement

4 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.

EMAP Standard

Standard 4.4.4: The mitigation plan shall be based on the natural and human-caused hazards identified by the jurisdiction and the risk and consequences of those hazards. The mitigation plan for the jurisdiction shall establish interim and long-term strategies, goals and objectives, programs, and actions to reduce vulnerability to the hazards identified including a cost-benefit analysis. The plan ranks projects based upon the greatest opportunity for loss reduction and documents how specific mitigation actions contribute to the overall risk reduction. The plan addresses an education and outreach strategy.

To update the mitigation actions from the previously approved plan, the responsible agency listed for each action completed a status worksheet describing whether the action was completed, incomplete, or ongoing. This worksheet is provided in Appendix C: Mitigation Action Evaluation. The Planning Subcommittee used this information to identify and prioritize mitigation actions.

To begin identifying a comprehensive range of mitigation actions at their second meeting on February 16, 2010, the Planning Subcommittee discussed the six categories of mitigation actions shown in Table 5-1.

Table 5-1: Categories of Mitigation Actions

Category	Definition
Prevention	Administrative or regulatory actions or processes that influence the way land and buildings are developed and built
Property Protection	Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area
Structural	Actions that involve the construction of structures to reduce the impact of hazard
Natural Resource Protection	Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems
Emergency Services	Actions that ensure the continuity of emergency services
Public Education and Awareness	Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them

Source: National Flood Insurance Program Community Rating System.

The Planning Subcommittee reviewed the mitigation actions identified in the 2005 plan and either revised the language to be included as an objective, or eliminated the action because it had been completed or was no longer feasible.

For this plan update, the Planning Subcommittee based the mitigation strategy on the results of the risk assessment and by carefully reviewing the actions identified in the 2005 plan.

The Planning subcommittee then reviewed a list of potential mitigation actions for each hazard. These potential actions included FEMA suggestions, URS recommendations, and projects suggested by the Planning Subcommittee throughout the planning process.

The Planning Subcommittee created a final list of mitigation actions for each hazard, comprised of re-worded actions from the 2005 plan and new mitigation actions developed through the workshop discussion. Through this process, the Planning Subcommittee made sure to include mitigation actions for each hazard and that addressed new and existing development. The list of mitigation actions is shown in Table 5-2.

The materials used during this process can be found in Appendix C: Mitigation Action Evaluation. The process of developing the mitigation goals, objectives, and actions was based on the hazards identified in the risk assessment; included mitigation actions to be accomplished in the short and long-term; included actions requiring collaboration between public and private entities; and included a prioritization process based on STAPLEE criteria, thus meeting the intent of EMAP Standards 4.4.1 and 4.4.4.

5.3 Prioritization and Implementation of Mitigation Actions

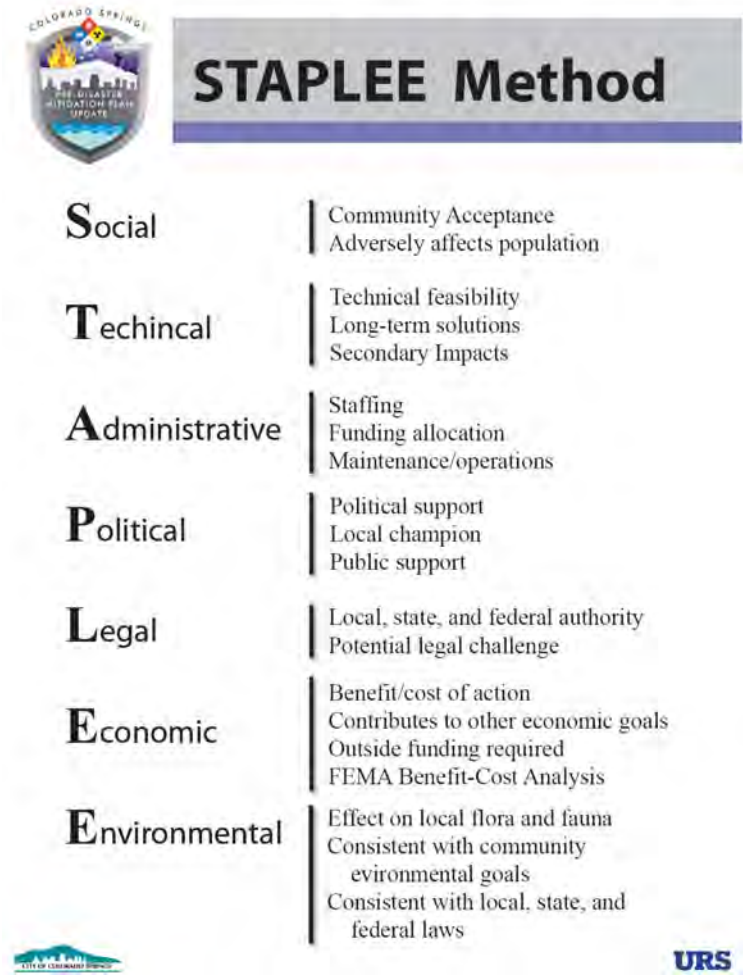
FEMA Requirement

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.

At their second meeting on February 16, 2010, the Planning Subcommittee analyzed and prioritized the range of actions identified during the mitigation workshop exercise.

Mitigation actions in the 2005 plan were given priority if they were identified as short-term projects due to cost effectiveness and available resources. Other factors for prioritization in 2005 were related to projects that were most vulnerable, have great social impact, are technically feasible, have limited environmental impact, have favorable economic impact, for which the administrative capabilities exist, those with potential politics, and the total expected costs. The Planning Subcommittee discussed and approved criteria for prioritizing the actions as part of the 2010 plan update process. Similar to the 2005 plan, their criteria are based upon the STAPLEE method, which assesses the social, technical, administrative, political, legal, economic, and environmental implications of each action. Each identified action was analyzed and ranked using the criteria defined in Figure 5-1.

Figure 5-1: STAPLEE Criteria Used for Prioritization of Mitigation Actions



Source: FEMA, *Local Multi-Hazard Mitigation Planning Guidance*, 1 July 2008.

The Planning Subcommittee reviewed each action once the final list was agreed upon. As a group effort, the Planning Subcommittee ranked each mitigation action as High, Medium, or Low priority. These priorities were based on the STAPLEE criteria and the likelihood of successful implementation.

The prioritized list of mitigation actions, goals, and objectives was compiled for additional review by the Planning Subcommittee in the weeks following the mitigation workshop on February 16, 2010. The Planning Subcommittee was asked to carefully review each action and priority, and to develop a mitigation action implementation matrix identifying the following characteristics for each action or project:

- Priority
- Responsible Agency
- Potential Funding Sources
- Cost Estimate
- Timeline

The Planning Subcommittee reviewed and prioritized mitigation actions and developed a strategy based on new projects, FEMA suggestions, and applicable actions from the 2005 plan.

As stated in the 2005 PDMP: *. . . there are a significant number [of actions] that are already implemented using existing programs and policies. Others will be implemented as they go through the public process and are further coordinated and staffed to ensure they are viable.* This still holds true for this 2010 update.

Continued Compliance with National Flood Insurance Program

The City of Colorado Springs currently participates in the National Flood Insurance Program (NFIP). The City also participated in the Community Rating System with a current rating of 8. Colorado Springs will continue participation in and compliance with the NFIP. Specific activities that the City will undertake to continue compliance include the following:

- Working with FEMA and the State in the map modernization program and adopting new DFIRMs when effective

- Improving education and outreach efforts regarding flooding throughout the City
- Achieve and maintain a Class 6 rating in the CRS program

Table 5-2 summarizes the prioritized mitigation actions for the City of Colorado Springs. The worksheets used for prioritization are included in Appendix B.

Table 5-2: Mitigation Action Matrix

Action #	Mitigation Action Description	Hazard	Responsible Agency
Objective A: Identify and initiate improvements to public safety, response, and recovery programs to reduce risk and vulnerability.			
A-1	Upgrade aging infrastructure such as transportation, drainage, utilities, and others that could be affected during a major natural disaster.	All Hazards	OEM, CSU, and Engineering
A-2	Evaluate repetitive loss properties and potential solutions to mitigate existing conditions.	Flood	OEM, PPRBD
A-3	Update and maintain the Jimmy Camp Creek and Cottonwood Creek Drainage Basin Planning Studies.	Flood	Engineering
A-4	Evaluate funding alternatives to achieve United States Army Corps of Engineers (USACE) certification of the Templeton Gap Floodway (levee).	Flood, Dam & Levee Failure	Engineering
Objective B: Follow through with and leverage existing organizations, programs, and procedures to implement the PDM Program.			
B-1	Continue to expand the capabilities and participation of the Emergency Management Committee and Volunteer Committee.	All Hazards	OEM
B-2	Develop a strategy to integrate the PDM plan with the City's strategic plan and other long-term planning documents.	All Hazards	Planning
B-3	Complete GIS and other automated inventories for stormwater, problem drainage areas, DFIRM and other City assets.	Flood	Engineering
B-4	Coordinate with Colorado Springs Utilities to review their current water conservation and drought programs.	Drought	CSU and OEM
B-5	Achieve and maintain a Class 6 rating in the Community Rating System (CRS) for floodplain management.	Flood	PPRBD and OEM
B-6	Review the Emergency Action Plans provided by Colorado Springs Utilities.	Dam & Levee Failure	OEM and CSU
B-7	Attend Emergency Action Plan exercises coordinated by Colorado Springs Utilities.	Dam & Levee Failure	OEM and CSU
B-8	Continue to develop programs and allocate resources for the reduction of fuels in potential wildfire areas. This includes continuing the Wildfire Mitigation program as well as organizing and providing resources that can be used to reduce natural fuels.	Wildfire	WM-Division of FM
B-9	Continue to develop partnerships with other organizations to implement wildfire mitigation plans and other hazard reduction programs.	Wildfire	WM-Division of FM

Action #	Mitigation Action Description	Hazard	Responsible Agency
B-10	Complete and maintain the 2010 Community Wildfire Protection Plan including the assessment of parcels identified in the Wildland Urban Interface.	Wildfire	WM-Division of FM
B-11	Implement the actions identified in the 2010 Community Wildfire Protection Plan.	Wildfire	WM-Division of FM
B-12	Work with the State Division of Water Resources to evaluate the dams that are not managed by Colorado Springs Utilities to determine high or significant impact and current conditions.	Dam & Levee Failure	OEM
Objective C: Build upon existing public outreach efforts to reduce risk and vulnerability to natural hazards.			
C-1	Collaborate with other stakeholders (public, businesses, non-profit organizations, government and regulatory agencies, and others) for public outreach efforts.	All Hazards	OEM
C-2	Continue the public outreach strategy to share responsibilities amongst the citizens, federal, state, and local governments.	All Hazards	OEM
C-3	Continue to operate the City's Office of Emergency Management natural hazards website.	All Hazards	OEM
C-4	Incorporate earthquakes in the Office of Emergency Management public outreach strategy.	Earthquake	OEM
Objective D: Leverage external financial assistance and other resources to strengthen the city's disaster resiliency.			
D-1	Continue to pursue additional grants to implement risk reduction projects.	All Hazards	OEM
Objective E: Continue to improve the regulatory review process for development and construction in the vicinity of known natural hazard areas.			
E-1	Continue to involve the Colorado Geological Survey in land use reviews and hazard assessments.	Landslide	Planning
Objective F: Continue to assess ongoing disaster preparedness programs that maintain or improve city preparedness.			
F-1	Achieve and maintain Emergency Management Accreditation Program certification.	All Hazards	OEM
F-2	Ensure the effectiveness of large-scale evacuation plans through full-scale tests.	Flood, Wildfire,	OEM
F-3	Maintain the programs and data outlined in the Special Needs Assessment and Plan.	All Hazards	OEM
F-4	Develop preparedness guides for Colorado Springs residents and businesses.	All Hazards	OEM
F-5	Continue to improve the communication of severe weather warnings, flood warning, and related information.	All Hazards	OEM
F-6	Prepare a feasibility study on updating the City's rain gauge automation system to the Gauge-Adjusted Radar Rainfall (GARR) System.	Flood	OEM
F-7	Consider the use of a resource management system to capture the financial data for natural hazard events.	All Hazards	OEM

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6. Plan Maintenance

This chapter provides a formal process to ensure that the City of Colorado Springs Pre-Disaster Mitigation Plan Update 2010 will remain an active and relevant document. The Plan maintenance process includes a method and schedule for all participating jurisdictions to participate in the process of monitoring, evaluating, and updating the Plan. This chapter also discusses the incorporation of this Plan into existing planning mechanisms and continued public involvement.

Plan Update

The previously approved plan identified plan maintenance procedures including method for monitoring, evaluating and updating the plan, implementing the plan through existing programs, and continued public involvement. The plan maintenance procedures identified in this 2010 Update are similar to the 2005 plan, yet incorporate a slightly more detailed approach.

6.1 Monitoring, Evaluating, and Updating the Plan

FEMA Requirement

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.

EMAP Standard

Standard 4.4.3: The program shall have a process to monitor overall progress of the mitigation strategies, documenting completed initiatives and quantifying the resulting reduction of limitation of hazard impact in the jurisdiction.

Plan Monitoring and Evaluating

Members of the City of Colorado Springs Planning Subcommittee (Planning Subcommittee) discussed and approved the plan maintenance procedures described in this chapter. The process outlined in this section meets the intent of EMAP Standard 4.4.3 by providing a clear monitoring process that documents progress prior to the next update. As in the 2005 PDMP, the City of Colorado Springs Office of Emergency Management will serve as the primary point of contact and will coordinate all local efforts to monitor, evaluate, and update the plan. The City of Colorado Springs will be responsible for implementing their specific mitigation actions and reporting on the status of these actions to the Office of Emergency Management. The 2005 PDMP

described the general process for monitoring and evaluating the plan. This 2010 update provides more detail as to how the plan will specifically be monitored including timing, responsibilities, and forms.

After this plan update is approved, the Planning Subcommittee is still engaged as the Mitigation Subcommittee. The Mitigation Subcommittee agrees to meet annually to evaluate the implementation of the City of Colorado Springs Pre-Disaster Mitigation Plan. The Office of Emergency Management is responsible for scheduling these meetings.

The purpose of the meetings 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

The Office of Emergency Management will email the Mitigation Project Progress Report (included in Appendix D) to each agency responsible for actions in the Plan two weeks prior to the scheduled meetings. These progress reports serve as criteria by which the mitigation strategy may be evaluated. During the meeting, the group will review and discuss their progress and how they have utilized the Plan.

Once a year, the Office of Emergency Management will also email the Mitigation Plan Annual Review Questionnaire to the Mitigation Subcommittee and will summarize these reports into an annual Mitigation Plan Progress Report, which will be incorporated into the Office of Emergency Management Annual Report to the City Council. After considering the findings of the submitted progress reports, the Mitigation Subcommittee may request that the implementing department or agency meet to discuss project conditions. Should review of the Plan warrant changes to the PDMP prior to the five-year update cycle, a notice and revised document will be provided to the City Council, the State and FEMA following the review and update.

Plan Update Process

The 2005 PDMP suggested that the plan update process occur every 2-3 years. For this update, the Director for the Office of Emergency Management will initiate a five-year plan update process within the time necessary to ensure that the current Plan does not expire before the updated plan is approved. The schedule will be sufficient to allow for the contracting for technical or professional services (if necessary); state and FEMA reviews; revisions, if necessary, based on FEMA review comments; and the adoption procedures of the participating jurisdictions. The Director for the Office of Emergency Management will coordinate the participation of the jurisdictions. The updated plan will meet FEMA's requirements and do the following:

- Consider changes in vulnerability due to action implementation
- Document areas where mitigation actions were or were not effective
- Incorporate new data or studies on hazards and risks
- Incorporate new capabilities or changes in capabilities
- Incorporate growth and development-related changes to inventories
- Incorporate new action recommendations or changes in action prioritization

The Mitigation Subcommittee will also meet after a disaster to focus on the following items:

- Identify potential mitigation projects, particularly those eligible for mitigation grant programs if available
- Evaluate effectiveness of existing mitigation projects
- Reassess hazard profiles and vulnerability

Updates to the plan will be accomplished through written changes and submissions incorporated by the City of Colorado Springs Office of Emergency Management and as approved by the Colorado Springs City Council.

6.2 Incorporation into Existing Planning Mechanisms

FEMA Requirement

44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

EMAP Standard

Standard 4.4.2: The mitigation program provides technical assistance consistent with the scope of the program such as implementing building codes, fire codes and land-use ordinances.

Original 2005 PDM Plan

The 2005 PDM Plan for the City of Colorado Springs established several mitigation actions aimed at strengthening multi-agency or departmental coordination while building upon the disaster resiliency of the city. Since the adoption of that plan, the City of Colorado Springs has made great strides, as documented in the 2005 mitigation action status report in Appendix C. One of the actions identified in the 2005 plan was to *capitalize on and leverage existing programs, processes, procedures, organizations, agencies and other elements in executing a comprehensive Pre-Disaster Mitigation Program.* Since 2005, The City of Colorado Springs has championed many efforts in this regard, including wildfire mitigation programs, creating a stormwater enterprise for drainage and flood control projects, and working closely with Pikes Peak Regional Building Department to raise the city's CRS rating. The OEM staff also initiated meetings with several departments within the city to begin inventorying the city's resources. Since the 2005 plan was adopted, the OEM and a mitigation subcommittee met on numerous occasions to track relevance and performance of the identified actions, and to shift focus when necessary depending on priorities, budget, and

risk. The OEM prepared annual reports to the City of Colorado Springs that included strategic priorities and inter-agency and stakeholder collaboration for mitigation and preparedness efforts.

Plan Update

The City of Colorado Springs Director for the Office of Emergency Management, with support and guidance provided by the Mitigation Committee, will work with the responsible agencies to incorporate this plan into the following existing planning mechanisms (and future updates of these mechanisms) where possible:

- City of Colorado Springs Comprehensive Plan
- City of Colorado Springs Community Wildfire Protection Plan (expected completion June 2010)
- City of Colorado Springs Catastrophic Incident Plan
- City of Colorado Springs Emergency Operations Plan
- Evacuation Plans
- Building Codes
- Site Plan Review
- Zoning, subdivision, and floodplain ordinances
- Capital improvement plan and City budgets
- Economic Development Plans
- Urban Renewal Plans
- Historic Preservation Plans
- Other plans and policies outlined in the Capability Assessment (Section 4.18)

Incorporation of Plan elements into existing planning mechanisms will require coordination between the Office of Emergency Management 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. Incorporation of this Plan into other planning mechanisms was specifically addressed in the mitigation strategy as action number *B-2: Develop a strategy to integrate the PDM plan with the City's strategic plan and other long-term planning documents.*

These guidelines for incorporating existing planning mechanisms meet the EMAP Standard 4.4.2 by clearly outlining the strategy for integration.

6.3 Continued Public Involvement

FEMA Requirement

44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The process outlined in the 2005 PDMP for continued public involvement still applies. This 2010 update provides more detail in how those concepts will be accomplished. The Mitigation Subcommittee is committed to identifying additional opportunities to raise community awareness about the plan and mitigation efforts in the City of Colorado Springs. This section complies with EMAP Standard 4.4.4 by addressing an education and outreach strategy. The plan document will be posted on the webpage of the City of Colorado Springs Office of Emergency Management. The website will contain an e-mail address and phone number to which people can direct their comments or concerns.

The Office of Emergency Management will present an update of the plan's progress in the annual report to City Council. This report will be available to the public and will include a section on local hazard mitigation planning (or similar).

The Office of Emergency Management and other members of the Mitigation Subcommittee will also identify opportunities to raise community awareness about the Plan and the hazards that affect the City of Colorado Springs. 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 Red Cross, events through other organizations, or by public mailings.

Any public comments received about the plan will be collected by the Office of Emergency Management and included in the Annual Plan Progress Report. During the plan update process, the Office of Emergency Management will develop a schedule for the public to submit comments to be considered for incorporation into the plan, as appropriate. All public comments will be attached as an appendix to plans that are submitted for approval by the State and FEMA.

Appendix A – Plan Review Crosswalk

INSTRUCTIONS FOR USING THE PLAN REVIEW CROSSWALK FOR REVIEW OF LOCAL MITIGATION PLANS

Attached is a Plan Review Crosswalk based on the ***Local Multi-Hazard Mitigation Planning Guidance***, published by FEMA in July, 2008. This Plan Review Crosswalk is consistent with the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* (Stafford Act), as amended by Section 322 of the *Disaster Mitigation Act of 2000* (P.L. 106-390), the *National Flood Insurance Act of 1968,* as amended by the *National Flood Insurance Reform Act of 2004* (P.L. 108-264) and *44 Code of Federal Regulations (CFR) Part 201 – Mitigation Planning,* inclusive of all amendments through October 31, 2007.

SCORING SYSTEM
N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.
S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Each requirement includes separate elements. All elements of a requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a summary score of "Satisfactory." A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing.

When reviewing single jurisdiction plans, reviewers may want to put an N/A in the boxes for multi-jurisdictional plan requirements. When reviewing multi-jurisdictional plans, however, all elements apply. States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements. Optional matrices for assisting in the review of sections on profiling hazards, assessing vulnerability, and identifying and analyzing mitigation actions are found at the end of the Plan Review Crosswalk.

The example below illustrates how to fill in the Plan Review Crosswalk.:

Assessing Vulnerability: Overview

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.*

Element	**Location in the Plan** (section or annex and page #)	**Reviewer's Comments**	**SCORE**	
			N	**S**
A. Does the **new or updated** plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	Section II, pp. 4-10	The plan describes the types of assets that are located within geographically defined hazard areas as well as those that would be affected by winter storms.		
B. Does the **new or updated** plan address the **impact** of each hazard on the jurisdiction?	Section II, pp. 10-20	The plan does not address the impact of two of the five hazards addressed in the plan. **Required Revisions:** • Include a description of the impact of floods and earthquakes on the assets. **Recommended Revisions:** This information can be presented in terms of dollar value or percentages of damage.		
		SUMMARY SCORE		

LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted. Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a **"Needs Improvement"** score.

Prerequisite(s) (Check Applicable Box)	**NOT MET**	**MET**
1. Adoption by the Local Governing Body: §201.6(c)(5) OR		
2. Multi-Jurisdictional Plan Adoption: §201.6(c)(5) **AND**		
3. Multi-Jurisdictional Planning Participation: §201.6(a)(3)		

Planning Process	**N**	**S**
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		

Risk Assessment	**N**	**S**
5. Identifying Hazards: §201.6(c)(2)(i)		
6. Profiling Hazards: §201.6(c)(2)(i)		
7. Assessing Vulnerability: Overview: §201.6(c)(2)(ii)		
8. Assessing Vulnerability: Addressing Repetitive Loss Properties. §201.6(c)(2)(ii)		
9. Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities: §201.6(c)(2)(ii)(B)		
10. Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)		
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)		
12. Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)		

*States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

SCORING SYSTEM

Please check one of the following for each requirement.

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Mitigation Strategy	**N**	**S**
13. Local Hazard Mitigation Goals: §201.6(c)(3)(i)		
14. Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)		
15. Identification and Analysis of Mitigation Actions: NFIP Compliance. §201.6(c)(3)(ii)		
16. Implementation of Mitigation Actions: §201.6(c)(3)(iii)		
17. Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)		

Plan Maintenance Process	**N**	**S**
18. Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(ii)		
19. Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		
20. Continued Public Involvement: §201.6(c)(4)(iii)		

Additional State Requirements*	**N**	**S**
Insert State Requirement		
Insert State Requirement		
Insert State Requirement		

LOCAL MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED	
See Reviewer's Comments	
PLAN APPROVED	

LOCAL MITIGATION PLAN REVIEW CROSSWALK

Local Mitigation Plan Review and Approval Status

Jurisdiction: City of Colorado Springs	**Title of Plan:** City of Colorado Springs Pre-Disaster Mitigation Plan Update 2010	**Date of Plan:** June 2010
Local Point of Contact: Bret Waters	**Address:** Colorado Springs Fire Department 375 Printers Parkway Colorado Springs, CO 80910	
Title: Director		
Agency: Office of Emergency Management		
Phone Number: (719) 385-5957	**E-Mail:** BWaters@springsgov.com	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region [Insert #]		
Plan Not Approved		
Plan Approved		
Date Approved		

Jurisdiction:	**NFIP Status***			
	Y	**N**	**N/A**	**CRS Class**
City of Colorado Springs	X			8

*** Notes:** **Y = Participating** **N = Not Participating** **N/A = Not Mapped**

LOCAL MITIGATION PLAN REVIEW CROSSWALK

PREREQUISITE(S)

1. Adoption by the Local Governing Body

***Requirement §201.6(c)(5)*:** *[The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Has the local governing body adopted **new or updated** plan?	To be adopted, insert in prerequisites			
B. Is supporting documentation, such as a resolution, included?	To be included in prerequisites			
		SUMMARY SCORE		

2. Multi-Jurisdictional Plan Adoption

***Requirement §201.6(c)(5)*:** *For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Does the **new or updated** plan indicate the specific jurisdictions represented in the plan?	Page 1-1			
B. For each jurisdiction, has the local governing body adopted the **new or updated** plan?	To be adopted			
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?	To be included in prerequisites			
		SUMMARY SCORE		

3. Multi-Jurisdictional Planning Participation

***Requirement §201.6(a)(3)*:** *Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process … Statewide plans will not be accepted as multi-jurisdictional plans.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Does the **new or updated** plan describe **how** each jurisdiction participated in the plan's development?	Pages 3-1 to 3-3			
B. Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?	Page 1-1			

SUMMARY SCORE		

PLANNING PROCESS: *§201.6(b): An open public involvement process is essential to the development of an effective plan.*

4. Documentation of the Planning Process

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process* ***shall*** *include:*
(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and 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.

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.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the plan provide a narrative description of the process followed to prepare the **new or updated** plan?	Chapter 3			
B. Does the **new or updated** plan indicate who was involved in the **current** planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, *etc*.?)	Pages 3-1, 3-6 to 3-7			
C. Does the **new or updated** plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	Pages 3-4 to 3-6			
D. **Does the new or updated plan discuss the** opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?	Pages 3-4 to 3-6			
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	Page 3-7			
F. Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?	Narrative provided within each Chapter			
		SUMMARY SCORE		

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

5. Identifying Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment **shall** include a] description of the type … of all natural hazards that can affect the jurisdiction.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include **a description** of the types of **all natural hazards** that affect the jurisdiction?	Page 4-5			
		SUMMARY SCORE		

6. Profiling Hazards

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the risk assessment identify the **location** (*i.e.*, geographic area affected) of each natural hazard addressed in the **new or updated** plan?	Chapter 4			
B. Does the risk assessment identify the **extent** (*i.e.*, magnitude or severity) of each hazard addressed in the **new or updated** plan?	Chapter 4			
C. Does the plan provide information on **previous occurrences** of each hazard addressed in the **new or updated** plan?	Chapter 4			
D. Does the plan include the **probability of future events** (*i.e.*, chance of occurrence) for each hazard addressed in the **new or updated** plan?	Chapter 4			
		SUMMARY SCORE		

7. Assessing Vulnerability: Overview

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.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	Chapter 4			
B. Does the **new or updated** plan address the **impact** of each hazard on the jurisdiction?	Chapter 4			
		SUMMARY SCORE		

8. Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): *[The risk assessment] **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of *repetitive loss properties* located in the identified hazard areas?	Page 4-42, Table 4-20	***Note: This requirement becomes effective for all local plans approved after October 1, 2008.***		
		SUMMARY SCORE		

9. Assessing Vulnerability: Identifying Structures

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 … .*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **existing** buildings, infrastructure, and critical facilities located in the identified hazard areas?	Chapter 4 – Flood, Earthquake, Landslide, Wildfire	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **future** buildings, infrastructure, and critical facilities located in the identified hazard areas?	Chapter 4 – Flood, Earthquake, Landslide, Wildfire	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

10. Assessing Vulnerability: Estimating Potential Losses

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)(ii)(A) of this section and a description of the methodology used to prepare the estimate … .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan estimate **potential dollar losses** to vulnerable structures?	Chapter 4 – Flood, Earthquake	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the **new or updated** plan describe the **methodology** used to prepare the estimate?	Chapter 4 – Flood, Earthquake, and Appendix G	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

11. Assessing Vulnerability: Analyzing Development Trends

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.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe land uses and development trends?	Throughout Chapter 4, and Page 4-144	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

12. Multi-Jurisdictional Risk Assessment

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?	n/a, single-jurisdictional plan			
		SUMMARY SCORE		

MITIGATION STRATEGY: *§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.*

13. Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy **shall** include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A Does the **new or updated** plan include a description of mitigation **goals** to reduce or avoid long-term vulnerabilities to the identified hazards?	Page 5-3			
		SUMMARY SCORE		

14. Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): *[The mitigation strategy **shall** include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?	5-8 to 5-9, and Appendix C			
B Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?	5-8 to 5-9, and Appendix C			
C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?	5-8 to 5-9, and Appendix C			
		SUMMARY SCORE		

15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Requirement: §201.6(c)(3)(ii): *[The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?	Page 5-7 narrative	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.***		
B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?	Actions A-2 and B-5, Pages 5-8 to 5-9	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.***		
		SUMMARY SCORE		

16. Implementation of Mitigation Actions

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

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** mitigation strategy include how the actions are **prioritized**? (For example, is there a discussion of the process and criteria used?)	Pages 5-5 to 5-7			
B. Does the **new or updated** mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources and the timeframe to complete each action?	Appendix C, and Page 5-7			
C. Does the **new or updated** prioritization process include an emphasis on the use of a **cost-benefit review** to maximize benefits?	STAPLEE, Pages 5-6 to 5-7			
D. Does the **updated** plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (*i.e.*, deferred), does the updated plan describe why no changes occurred?	Appendix C, and narrative provided throughout Chapter 5			
		SUMMARY SCORE		

17. Multi-Jurisdictional Mitigation Actions

Requirement §201.6(c)(3)(iv): *For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A Does the **new or updated** plan include identifiable **action items** for each jurisdiction requesting FEMA approval of the plan?	n/a, single-jurisdictional plan.			
B. Does the **updated** plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (*i.e.*, deferred), does the updated plan describe why no changes occurred?	Appendix C, status update			
		SUMMARY SCORE		

PLAN MAINTENANCE PROCESS

18. Monitoring, Evaluating, and Updating the Plan

Requirement §201.6(c)(4)(i): *[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.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe the method and schedule for **monitoring** the plan, including the responsible department?	Pages 6-1 to 6-3			
B. Does the **new or updated** plan describe the method and schedule for **evaluating** the plan, including how, when and by whom (*i.e.* the responsible department)?	Pages 6-1 to 6-3			
C. Does the **new or updated** plan describe the method and schedule for **updating** the plan within the five-year cycle?	Pages 6-1 to 6-3			
		SUMMARY SCORE		

19. Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?	Pages 6-3 to 6-4			
B. Does the **new or updated** plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (*e.g.*, risk assessment) into other planning mechanisms, when appropriate?	Pages 6-3 to 6-4			
C. Does the **updated** plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (*e.g.*, risk assessment) into other planning mechanisms, when appropriate?	Pages 6-3 to 6-4			
		SUMMARY SCORE		

Continued Public Involvement

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.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	Pages 6-4 to 6-5			
		SUMMARY SCORE		

MATRIX A: PROFILING HAZARDS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that their plan addresses each natural hazard that can affect the jurisdiction. **Completing the matrix is not required**.

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each** applicable **hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Location		B. Extent		C. Previous Occurrences		D. Probability of Future Events	
	Yes	N	S	N	S	N	S	N	S
Avalanche	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dam Failure	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐	☐	☐	☐	☐
Earthquake	☐	☐	☐	☐	☐	☐	☐	☐	☐
Expansive Soils	☐	☐	☐	☐	☐	☐	☐	☐	☐
Levee Failure	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flood	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hailstorm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hurricane	☐	☐	☐	☐	☐	☐	☐	☐	☐
Land Subsidence	☐	☐	☐	☐	☐	☐	☐	☐	☐
Landslide	☐	☐	☐	☐	☐	☐	☐	☐	☐
Severe Winter Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tornado	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tsunami	☐	☐	☐	☐	☐	☐	☐	☐	☐
Volcano	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wildfire	☐	☐	☐	☐	☐	☐	☐	☐	☐
Windstorm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐

To check boxes, double click on the box and change the default value to "checked."

Legend:

§201.6(c)(2)(i) Profiling Hazards
A. Does the risk assessment identify the location (*i.e.*, geographic area affected) of each hazard addressed in the **new or updated** plan?
B. Does the risk assessment identify the extent (*i.e.*, magnitude or severity) of each hazard addressed in the **new or updated** plan?
C. Does the plan provide information on previous occurrences of each natural hazard addressed in the **new or updated** plan?
D. Does the plan include the probability of future events (*i.e.*, chance of occurrence) for each hazard addressed in the plan?

MATRIX B: ASSESSING VULNERABILITY

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that the new or updated plan addresses each requirement. **Completing the matrix is not required**.

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each ***applicable*** *hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk. Note: Receiving an N in the shaded columns will not preclude the plan from passing.*

To check boxes, double click on the box and change the default value to "checked."

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	§201.6(c)(2)(ii) Assessing Vulnerability: Overview					§201.6(c)(2)(ii) Assessing Vulnerability: Identifying Structures				§201.6(c)(2)(ii) Assessing Vulnerability: Estimating Potential Losses				
		A. Overall Summary Description of Vulnerability		B. Hazard Impact			A. Types and Number of Existing Structures in Hazard Area (Estimate)		B. Types and Number of Future Structures in Hazard Area (Estimate)		A. Loss Estimate		B. Methodology		
	Yes	N	S	N	S		N	S	N	S	N	S	N	S	
Avalanche	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Coastal Erosion	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Coastal Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Dam Failure	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Drought	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Earthquake	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Expansive Soils	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Levee Failure	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Flood	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Hailstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Hurricane	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Land Subsidence	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Landslide	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Severe Winter Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Tornado	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Tsunami	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Volcano	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Wildfire	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Windstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	

Legend:

§201.6(c)(2)(ii) Assessing Vulnerability: Overview

A. Does the **new or updated** plan include an overall summary description of the jurisdiction's vulnerability to each hazard?

B. Does the **new or updated** plan address the impact of each hazard on the jurisdiction?

§201.6(c)(2)(ii)(A) Assessing Vulnerability: Identifying Structures

A. Does the **new or updated** plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?

B. Does the **new or updated** plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

§201.6(c)(2)(ii)(B) Assessing Vulnerability: Estimating Potential Losses

A. Does the **new or updated** plan estimate potential dollar losses to vulnerable structures?

B. Does the **new or updated** plan describe the methodology used to prepare the estimate?

MATRIX C: IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure consideration of a range of actions for each hazard. **Completing the matrix is not required.**

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each ***applicable*** *hazard. An "N" for any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Comprehensive Range of Actions and Projects	
	Yes	N	S
Avalanche	☐	☐	☐
Coastal Erosion	☐	☐	☐
Coastal Storm	☐	☐	☐
Dam Failure	☐	☐	☐
Drought	☐	☐	☐
Earthquake	☐	☐	☐
Expansive Soils	☐	☐	☐
Levee Failure	☐	☐	☐
Flood	☐	☐	☐
Hailstorm	☐	☐	☐
Hurricane	☐	☐	☐
Land Subsidence	☐	☐	☐
Landslide	☐	☐	☐
Severe Winter Storm	☐	☐	☐
Tornado	☐	☐	☐
Tsunami	☐	☐	☐
Volcano	☐	☐	☐
Wildfire	☐	☐	☐
Windstorm	☐	☐	☐
Other _____	☐	☐	☐
Other _____	☐	☐	☐
Other _____	☐	☐	☐

To check boxes, double click on the box and change the default value to "checked."

Legend:
§201.6(c)(3)(ii) Identification and Analysis of Mitigation Actions
A. Does the **new or updated** plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?

Appendix B – Planning Process Documentation

CONTENTS:

1. Project initiation meeting agenda
2. Project initiation meeting minutes
3. Subcommittee project kickoff and risk assessment meeting agenda
4. Subcommittee project kickoff and risk assessment meeting minutes
5. Subcommittee project kickoff and risk assessment meeting sign-in sheet
6. Mitigation strategy workshop agenda
7. Mitigation strategy workshop sign-in sheet
8. Subject Matter Authority (SMA) survey sample list
9. Link to online survey sent by email from Bill Mills, CSFD Project Manager
10. Public outreach strategy outline
11. PPACG meeting agenda and slides
12. Colorado Springs City Council agenda
13. CONO public briefing sign-in sheet
14. Colorado Springs *Gazette* notification for community briefing
15. Colorado Springs *Edition* notification for community briefing
16. Colorado Springs *Independent* notification for community briefing
17. Screen shot from OEM site notification of community briefing
18. Press release from OEM regarding community briefing
19. Screen shot from OEM site containing the draft risk assessment for review

URS

City of Colorado Springs
Multi-Hazard Mitigation Plan Update
Project Initiation Meeting

October 6, 2009
Fire Department Complex
Administrative Conference Room
9:00am to 11:00am

AGENDA

1. Introductions: Roles and Responsibilities

2. Plan Update Schedule and Process

3. Plan Update Participants: EM Council, Planning Committee, and/or Possible Subcommittees

4. Coordination with Catastrophic Incident Plan

5. Multi-Jurisdictional Participation

6. Public Outreach Strategy

7. Review FEMA G-318 Training Workshop Notebook

8. Next Steps

City of Colorado Springs
Multi-Hazard Mitigation Plan Update
Project Initiation Meeting
October 6, 2009

MINUTES

Distribution:

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Tareq Wafaie, tareq_wafaie@urscorp.com
Trista Caldwell, trista_caldwell@sra.com
Brian Collins, brian_collins@urscorp.com

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1. Roles and Responsibilities

Action By: URS and COS
Action: URS will encourage task order approval and finalization and COS will determine if they can send an email granting URS a Notice to Proceed.

NOTES

Bret Waters will serve as Project Executive championing the project to citywide management and providing problem solving authority, and signing off on documents, etc.

Bill Mills of OEM is the Project Manager on the PDM and FMA and will coordinate all Colorado Springs efforts.

Ken Brink of OEM is the grants administrator and will keep us on track and communicate directives from Bret Waters.

Brian Collins of SRA will be looking for linkages to the Catastrophic Incident Plan (CAT). Brian will manage the SRA tasks on the PDM/FMA.

Trista Caldwell of SRA will be working on the CAT, specifically Tasks 2 and 3, conducting hazard identification and scenario development. She will incorporate the findings of the PDM into the CAT.

Margaret Doherty of URS is the Project Manager on the PDM and FMA and will coordinate all URS efforts. She will be the main POC between the URS team and the City of Colorado Springs for all things PDM and FMA.

Bill Mills of OEM is the Project Manager on the PDM and FMA and will coordinate all Colorado Springs efforts.

Ken Brink of OEM is the grants administrator and will keep us on track and communicate directives from Bret Waters.

David Cooper of URS will keep the project on scope and support

		the PDM Subcommittee in their development of the mitigation strategy. **Jennifer Hall** of URS will write the plan, specifically the Risk Assessment with Tareq Wafaie (not present), also of URS.
2.	**Plan Update Schedule and Process** **Action By:** Tareq Wafaie ***Action:*** PDM/FMA Project Schedule	URS to provide a project schedule that can be coordinated with the CAT. The typical FEMA process includes the following 10 steps: 1) Organize the planning effort; 2) Involve the public; 3) Coordinate with other departments and agencies; 4) Identify the hazards; 5) Assess the risks; 6) Set goals; 7) Develop possible mitigation actions; 8)Draft and prioritize mitigation strategies; 9) Adopt the plan; and 10) Implement, evaluate, and revise the plan. The City would like to see the PDM approved (including local adoption) by April 2010.
3.	**Plan Update Participants** ***Action By:*** David Cooper ***Action:*** Develop Communications Plan for PDM/FMA. **Action By:** Bill Mills **Action:** Next Steps for video **Action By:** Rich Chamberlain **Action:** Rich Chamberlain (URS GIS) to contact David Blankenship (Springs GIS) to begin conversation regarding coordination	An Emergency Management Committee (EMC) has been approved by the City of Colorado Springs City Manager. Invitations have been distributed to potential EMC members. PDM, FMA, and CAT Subcommittees will be created; names have been assigned but not confirmed. A Communication Plan with the EMC and the subcommittees may be appropriate. Bill suggested the kick-off meeting be conducted through a video (produced by the City of Colorado Springs) to the Subcommittees, followed by a Q/A. This requires more discussion regarding who should make the presentation, the presentation content, etc.
4.	**Coordination with Catastrophic Incident Plan:** ***Action By:*** Margaret Doherty ***Action:*** Submit Project Schedule and Communications Plan for COS and SRA review.	The Project Schedule and Communications Plan should include specific areas of coordination.
5.	**Multi-Jurisdictional Participation:** ***Action By: Margaret Doherty*** ***Action:*** Bill and Margaret will discuss the potential jurisdictions that we could invite to join the process in order to comply with	The City may want to consider whether the following agencies should participate in the plan, i.e. seek plan approval by FEMA in order to be an eligible applicant for FEMA grant programs: Universities, school districts, Private Nonprofit Organizations, and special districts. To obtain eligibility for FEMA mitigation grant programs, jurisdictions participating in a multi-jurisdictional plan must

PDM guidance.

complete the following steps:

1. Designate a representative to participate at the same level as the PDM Subcommittee members;
2. Assist in the development of a risk assessment and mitigation actions specific to their jurisdiction; and
3. Formally adopt the mitigation plan once complete.

Benefits to Participation

The benefits to jurisdiction of participating in this project include the following:

- Shares costs and resources and avoids duplication of efforts;
- Improves coordination and communication among local governments and districts;
- Develops comprehensive approaches to reduce risks that affect the City; and
- Establishes eligibility to submit applications for FEMA mitigation project grants.

6. Review G-318 Training Workshop Notebook

Action By:
Action:

Throughout the meeting, the Training Workshop Notebook was referenced. URS left Bill Mills with a copy of the City and County of San Francisco Hazard Mitigation Plan Update (2009) and the Elbert County Multi Hazard Mitigation Plan Update (2009) as reference documents for his review. Based on their feedback, the Elbert County plan format and methodology is the preferred.

7. Public Outreach Strategy

Action By:
Action:

Public Outreach or "Public Involvement" as it is referred to by FEMA, is required at two stages in the plan development process; during the drafting stage and prior to being adopted.

Bill Mills provided the list of individuals asked to complete a survey of hazard awareness/perceptions and his preliminary results. Final results will be incorporated into the plan.

Margaret Doherty suggested that a presentation to the City of Colorado Springs Planning Commission would be a good strategy for reaching the planning community. The meetings meet commonly recognized standards for public notice and the minutes can be attached to the plan document.

Pre-Disaster Mitigation Plan Subcommittee
Project Kick-off & Risk Assessment Meeting
December 16, 2009
Fire Department Complex
2 - 4 PM

AGENDA

2:00	Welcome, Introductions, and Meeting “To Do List”
2:10	Multi-Hazard Mitigation Plan Update Purpose, Process, and Benefits
2:30	Document Outline and Coordination with the Catastrophic Incident (CAT) Plan
2:45	BREAK
3:00	Natural Hazard Identification and Risk Assessment Methodology
3:50	“To Do List” Check
4:00	Adjourn

URS

Memorandum

Date: December 17, 2009

To: Colorado Springs PDM Plan Update Subcommittee

From: Margaret Doherty, URS Project Manager

Subject: **Meeting Minutes: Colorado Springs PDM Plan Update Kickoff/Risk Assessment**

This memo includes the meeting minutes from the December 16, 2009 Subcommittee meeting #1. The meeting was held from 2:00 to 4:00 p.m. at the Fire Department Complex in Colorado Springs, Colorado.

1. Introductions

The Subcommittee introduced themselves providing the name of the agency they represent and their expectations for the project.

Bill Mills	Colorado Springs Fire Department (CSFD)
David Blankinship	CSFD
Jay Weightman	CSFD
Christina Randall	CSFD
Brett Lacey	CSFD
Scott Whittington	CSPD
Bret Waters	Colorado Springs Office of Emergency Management (CSOEM) – Division Manager
Ken Brink	CSOEM
Rick O'Connor	CS – Land Use Review
Tama Wagoner	Colorado Springs Utilities (CSU)
Linda Offerle	CSU
Brian Collins	OEM – SRA Int'l
Margaret Doherty	URS
Jennifer Orozco	URS
Tareq Wafaie	URS
David Cooper	URS
Rich Chamberlain	URS

2. Hazard Mitigation Project Overview

URS provided a brief project overview. The Subcommittee will complete the Pre-Disaster Mitigation (PDM) Plan Update for FEMA approval. This is an update of the original 2005 PDM Plan

The cost of natural disasters has risen significantly due to increased vulnerability with population and development growth. The Disaster Mitigation Act of 2000 (DMA 2000) amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act to include, among other changes, Section 322- Mitigation Planning. This section places new emphasis on local mitigation planning

and requires local governments to develop and adopt a hazard mitigation plan as a condition of receiving mitigation project grants under the Pre-Disaster Mitigation Program and the post-disaster Hazard Mitigation Grant Program. DMA 2000 helps to enable effective risk reduction, promote sustainable communities, reward local planning efforts, and facilitate state and local coordination. It is an effort to "break the cycle" of disaster-rebuild-disaster-rebuild, as many disaster events are repetitive and predictable.

FEMA defines mitigation as: *sustained action taken to reduce or eliminate long-term risk to human life and property from natural hazards.* Mitigation distinguishes actions that have a long-term impact from those actions that are more closely associated with preparedness for, immediate response to, and short-term recovery from a specific event.

Mitigation is the focus of this planning process, and the action items or 'projects' defined through this process should be related to mitigation. The group discussed six categories of mitigation projects:

- *Prevention* - Administrative or regulatory actions or processes that influence the way land and buildings are developed and built
- *Property Protection* - Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area
- Structural - Actions that involve the construction of structures to reduce the impact of hazard
- *Public Education and Awareness* - Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them
- *Natural Resource Protection* - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems
- *Emergency Services Protection* - Actions that ensure the continuity of emergency services

3. Public Outreach Strategy

FEMA requires that the public have the opportunity to be involved in the planning process. The process must include opportunity for public comment on the plan during the drafting stage and on the draft plan prior to plan approval. URS highlighted multiple public involvement strategies in order to meet this requirement:

- Include all levels (residents, businesses, state/local agencies, non-profits, etc.)
- Advertise public meetings
- Combine with other regularly scheduled meetings or community events
- Surveys and questionnaires

The Subcommittee deliberated about the most appropriate methods for involving the public. The team has already completed a survey of 411 citizens within multiple zip codes throughout the City. Bret Waters and Rick O'Connor will discuss a way to provide an update to either the Planning Commission, City Council, or both, ensuring that the public is notified of this update. The Subcommittee mentioned that someone on staff could create a PDM Plan Update link on the City website. The Subcommittee also discussed the option of a presentation to the Colorado Springs Council of Neighbors and Organizations (CONO). It may also be possible to air a public service announcement about the plan on the local radio station(s) and provide a press release in the local paper. Seeking public comment will be particularly important following the next meeting (January 2010), however it is never too early to begin getting the word out within the communities and disseminating information on websites and newspapers.

4. PDM Subcommittee Responsibilities

URS discussed the responsibilities of the Subcommittee members. The Subcommittee will:

- Provide data and institutional knowledge
- Communicate plan progress with agency/departments
- Review risk assessment and critique vulnerability analysis
- Update the mitigation strategy and prioritize mitigation actions
- Review and provide comments on draft plan

5. Coordination with Catastrophic Incident (CAT) Plan and Plan outline

URS discussed the coordination with the CAT Plan. Because the human-caused hazards from the CAT Plan are on a different timeline, the information will be inserted likely as an appendix to the PDM Plan Update. Because human-caused hazards are not reviewed by FEMA, this provides them with a clean document that follows the requirements of the FEMA crosswalk. In addition, the work conducted for the enhanced flood analysis through the Flood Mitigation Assistance (FMA) grant will also likely be included as an appendix. The general outline of the PDM Plan Update is as follows:

Executive Summary
Chapter 1 – Introduction
Chapter 2 – Community Profile
Chapter 3 – Planning Process
Chapter 4 – Risk Assessment
Chapter 5 – Mitigation Strategy
Chapter 6 – Plan Maintenance
Appendices

6. Risk Assessment and Hazard Identification

The risk assessment is the process for evaluating the potential for loss associated with the natural hazards that may occur in Colorado Springs. A hazard is an act or phenomenon that has the potential to produce harm or other undesirable consequences to people, structures, or infrastructure. Hazards exist with or without the presence of people and land development. When severe hazards coincide with vulnerable development, disasters can occur.

The Subcommittee briefly reviewed the 2005 PDM Plan. URS discussed what the 2010 PDM Plan Update will include. The significant differences include:

- Profiles for a greater range of potential hazards
- Comprehensive lists of previous events
- Local characterization of risks
- Improved loss estimates
- Capability assessment

The first step in the risk assessment process is to identify the hazards that threaten or may occur in the community. Although the particular priority or significance of each hazard was not defined, the following natural hazards were identified for Colorado Springs:

- Dam and levee failure
- Drought
- Earthquake
- Flood
- Hail
- Landslide
- Lightning
- Severe Winter Storm
- Tornado
- Wildfire
- Windstorm
- Human-caused hazards

The plan will include a hazard profile for each of these hazards in the Risk Assessment. The profile includes geographic location, past events, future probability (how often an event is likely to occur in a given time period), magnitude/severity (how bad the event might be), and vulnerability (susceptibility of population, structures, infrastructure, and community assets to damage and loss). Vulnerability must be considered in terms of existing development and how hazards might affect future development. Also included in the risk assessment is the community asset inventory and capability assessment.

URS provided a comprehensive description of the methodology for completing the risk assessment, including sources used, analyzing the vulnerability, and probable maps and tables.

The Subcommittee also identified the following issues, concerns, and historical events for Colorado Springs:

- Use of the Emergency Action Plans for Dams
- Water restriction years from CSU
- Post-fire mudslides
- Subsidence vs. landslides
- Lightning strike data from Bill Wallace
- Dames & Moore study for mining
- Wind sheer data from airport/accident in Fountain
- Stormwater program dissolved
- Templeton Gap levee completion
- Xeriscape educational program
- Imagery for irrigated acreage?
- Class A Roof regulations
- Power outage data/I-25 road closures
- Special needs population plan upcoming
- Silver Key – Meals on Wheels

7. HAZUS – MH4

URS described the software developed by FEMA to assess risk and vulnerability, and reduce losses to natural hazards. This software will be used for flooding and earthquake modeling. The output from this modeling software includes mapping of potential hazard areas, and a

comprehensive estimation of losses resulting from a major event. URS will use HAZUS – MH4 in collaboration with City data to produce the best available estimation of losses where possible.

8. Next Steps

Next meeting tentatively end of January 2010 (to be scheduled in mid-January)

- Review the risk assessment
- Finalize the public involvement plan
- Update status of 2005 PDM Plan mitigation actions
- Identify potential mitigation actions for each identified hazard

ACTION ITEMS:

1. Subcommittee to contact Tareq Wafaie with any comments on the Plan outline
2. Subcommittee to contact Tareq Wafaie with any comments on the 2005 Plan
3. URS to work with contacts identified during meeting to obtain data/information for completing the risk assessment.

URS Contacts

Tareq Wafaie, AICP
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URS

DATE _____

PROJECT NO. _____

PAGE NO. ____ OF ____ BY _____

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Pre-Disaster Mitigation Plan Subcommittee
Mitigation Strategy Workshop
February 16, 2010
11:00 a.m. – 3:00 p.m.

AGENDA

1. **Welcome and Introductions**
2. **Brief Review of Plan Purpose and Process**
3. **Results of Risk Assessment**

Break (15 minutes)

4. **Review Goals & Actions from 2005 PDMP**
5. **Mitigation Strategy Development (Goals and Actions)**
6. **Mitigation Action Prioritization Exercise**
7. **Next Steps**

4 0

COLORADO SPRINGS
PRE-DISASTER MITIGATION PLAN UPDATE

Pre-Disaster Mitigation Plan Subcommittee
Mitigation Strategy Workshop
February 16, 2010

	NAME (Print)	AGENCY	PHONE	EMAIL
1	Tama Wagoner	CSU	668-4181	Twagoner@csu.org
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9	Bob Craft	RBD	327 2940	Bob@PPRBD.org
10	ROGER LOVELL	RBD	327-2994	ROGER@PPRBD.ORG
11	Erin Duran	SCR	385-7274	eduran@springsgov.com
12	Rick O'Connor	LUR	385-5365	rkoconnor@springsgov.com
13	KEN BRINK	CSOEM	385-7228	KBRINK@SPRINGSGOV.COM
14	Fred Waters	CSOEM	385 5957	fwaters@springsgov.com
15	Christina Randall	CSFD	385-7368	crandall@springsgov.com
16	KAY YEAGER	CSPD	385 7356	Kyeager@springsgov.com

CITY OF COLORADO SPRINGS

URS

	NAME (Print)	AGENCY	PHONE	EMAIL
17	CROFT	RBD	327-2914	bob@pprbd.org
18	Bill Mills	OEM	385-7246	wmills@springsgov.com
19				
20				
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Subject Matter Authority Survey Sample
8/1/09

POC	TITLE	AGENCY	URS TYPICAL LIST	EMAIL
Anderson Jim	Manager	EPO/Teller E-911	Communications	jim.anderson@elpasoteller911.org.
Anderson Mike	Asstant City Manager	City COS	City Council	manderson@springsgov.com
Anderwald Dick	Director	City COS-Planning and Land Use	Land Use	danderwald@springsgov.com
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Baxter Patricia	Manager	EPCESD	Emergency Management	patriciabaxter@elpasoco.com
Bigelow Lisa	Director	City COS Economic Development	Community Development	lbigelow@springsgov.com
Borland Larry	Security Director	School Dist 20	School	larry.borland@asd20.org
Brink Ken	Senior Analyst	City COS OEM	Emergency Management	kbrink@springsgov.com
Butcher Paul	Manager	Parks and Cultural Services	Conservation/Open Space	pbutcher@springsgov.com
Cambron Charles	Director	USAFA-Medical	Health and Environment	charles.cambron@usafa.af.mil
Condit Tom	Flood Plain Manager	Pike Peak Regional Building	Building	tim@pprbd.org
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Cox Steve	Fire Chief	City COS-CSFD	Emergency Management	scox@springsgov.com
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Duckarmenn Victor	Director	Peterson AFB-Security	Security	victor.duckarmenn@peterson.af.mil
Duvall Richard	Detective	City COS-CSPD-Intelligence	Emergency Management	DUVALLRI@springsgov.com
Earle Mark	Director	City COS-Airport	Emergency Management	mearle@springsgov.com
Foltz Brian	Director	UCCS-Police	Emergency Management	bfoltz@uccs.edu
Force Jeff	Coordinator	Penrose Hopsital-Security	Security	jeff.force@ppcc.edu
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Glaven Jack	Manager	City COS-Pikes Peak	Health/Environment	jglaven@springsgov.com
Gorton Dan	Manager	PP Radio Communication Network	Communications	DGORTON@springsgov.com
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Johnson Kurt	Manager	UCCS	School	kjohnso9@uccs.edu
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Khattak Saleem	Manager	City COS-Streets Department	Road and Bridge	skhattak@springsgov.com
Lacey Brett	Fire Marshal	City COS-CSFD	Building	blacey@springsgov.com
Laird Brandt	Security Director	Colorado Springs Utilities	Security	blaird@csu.org
Linebaugh Dave	Security Director	Penrose Hospital	Health/Environment	DavidLinebaugh@centura.org
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Mayerl James	Senior Planner	City COS	Land Use	jmayerl@springsgov.com
McNair Cam	City Engineer	City COS	Road and Bridge	cmcnair@springsgov.com
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White Richard	Director	UCCS Homeland Security	School	rwhite2@uccs.edu
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Yeager Kay	HazMat Specialist	City COS-CSFD	Emergency Management	kyeager@springsgov.com

Margaret Doherty/Denver/URSCorp
12/15/2009 11:43 AM

To Tareq Wafaie/Denver/URSCorp@URSCorp
cc
bcc
Subject Fw: Your Opinion is Important - REMINDER

----- Forwarded by Margaret Doherty/Denver/URSCorp on 12/15/2009 11:43 AM -----

"Mills, William C." <wmills@springsgov.com>
08/26/2009 01:34 PM

To "Velasquez, Terri" <terrivelasquez@springsgov.com>, "Yeager, Kay A." <kyeager@springsgov.com>, "Lacey, Brett" <BLacey@springsgov.com>, <henry@pprbd.org>, <jim.anderson@elpasoteller911.org.>, <lbrown@elpasoco.com>, "DOLL, Kerry L." <DOLLKE@ci.colospgs.co.us>, "Gorton, Daniel" <DGORTON@springsgov.com>, <james.kramer@comcast.net>, <toloa@centurytel.net>, <mproctor1@juno.com>, <BobRicketts@elpasoco.com>, <schoensr@pcibroadband.net>, "YOUNG, Tina A." <YOUNGTI@ci.colospgs.co.us>, <trista_caldwell@sra.com>, <brian_collins@sra.com>, <margaret_doherty@urscorp.com>, <victor.duckarmenn@peterson.af.mil>, "COX, Steven W" <SCox@Springsgov.com>, "DUVALL, Richard F." <DUVALLRI@ci.colospgs.co.us>, "MYERS, Richard (personal)" <MYERSRI@ci.colospgs.co.us>, "WALKER, Rod (Personal)" <WALKERRO@ci.colospgs.co.us>, <DM7513@yahoo.com>, "Randall, Christina M." <crandall@springsgov.com>, <dtotman@csu.org>, <twagoner@csu.org>, <blaird@csu.org>, <thomas.magnuson@noaa.gov>, <Marilyn.Galley@state.co.us>, <Kevin.houck@state.co.us>, "BARRENTINE, James R." <BARRENJA@ci.colospgs.co.us>, "Brink, Kenneth M." <KBrink@springsgov.com>, "ORTIZ, Jesus D." <JOrtiz@SpringsGov.com>, "SMITH, Scott D (CSFD)" <ScottSmith@Springsgov.com>, "Waters, Bret M." <BWaters@SpringsGov.com>, "WHITTINGTON, Scott A." <WHITTISC@ci.colospgs.co.us>, <patriciabaxter@elpasoco.com>, <JimReid@elpasoco.com>, <Jason.arnold@usafa.af.mil>, <sarah.nordstrom@cdps.state.co.us>, "Blanchard, Tobi A." <TBlanchard@springsgov.com>, "Duran, Erin L." <SCRC@Springsgov.com>, "Anderson, Mike" <MANDERSON@springsgov.com>, "Skiffington-Blumberg, Sue" <sskiffington-blumberg@springsgov.com>, "Johnson, Nancy" <njohnson@springsgov.com>, "Miskel, Lori" <LMiskel@springsgov.com>, "Anderwald, Dick" <dAnderwald@springsgov.com>, "Decapite, Curt" <cdecapite@springsgov.com>, "Sampley, Ken" <KSampley@springsgov.com>, "Khattak, Saleem" <skhattak@springsgov.com>, <charles.cambron@usafa.af.mil>, <tim@pprbd.org>, <guruljd@d11.org>, <hayc@mscd.edu>, <jeff.force@ppcc.edu>, <larry.borland@asd20.org>, <bfoltz@uccs.edu>, <kjohnso9@uccs.edu>, <rwhite2@uccs.edu>, "DUBAY, Steven E" <SDubay@springsgov.com>, "Bigelow, Lisa" <LBigelow@springsgov.com>, "Warnke, Greg" <GWarnke@springsgov.com>, "Glavan, Jack"

<JGlavan@springsgov.com>, "Mayerl, James" <JMayerl@springsgov.com>, <cindy.corsaro@memorialhealthsystem.com>, <frankie@epcms.org>, <DavidLinebaugh@centura.org>, <blmayfield@aol.com>, <jwilliams@pparc.org>, <clint.peterson@peakvista.org>, <lisapowell@epchealth.org>, <helenrogers@epchealth.org>, <art.vigil@healthsouth.com>, "Matthews, Curlie" <cmatthews@springsgov.com>, "Butcher, Paul" <pbutcher@springsgov.com>, <sue.crane-jennings@aeroflex.com>, "Earle, Mark" <MEarle@springsgov.com>, "McNair, Cam" <CMcNair@springsgov.com>

cc

Subject Your Opinion is Important - REMINDER

If you have already filled out the survey below, thank you! If you have not, please take a few moments to complete the survey below.

Thank you~
Bill Mills

From: Mills, William C.

Sent: Thursday, August 20, 2009 11:11 AM

To: Velasquez, Terri; Yeager, Kay A.; Lacey, Brett; 'henry@pprbd.org'; 'jim.anderson@elpasoteller911.org.'; 'lbrown@elpasoco.com'; DOLL, Kerry L.; Gorton, Daniel; 'james.kramer@comcast.net'; 'toloa@centurytel.net'; 'mproctor1@juno.com'; 'BobRicketts@elpasoco.com'; 'schoensr@pcibroadband.net'; YOUNG, Tina A.; 'trista_caldwell@sra.com'; 'brian_collins@sra.com'; 'margaret_doherty@urscorp.com'; 'victor.duckarmenn@peterson.af.mil'; COX, Steven W; DUVALL, Richard F.; 'rmeyers@springsgov.com'; WALKER, Rod (Personal); 'DM7513@yahoo.com'; Randall, Christina M.; 'dtottman@csu.org'; 'twagoner@csu.org'; 'blaird@csu.org'; 'thomas.magneson@noaa.gov'; 'marilyn.galley@state.co.us'; 'Kevin.houck@state.co.us'; BARRENTINE, James R.; Brink, Kenneth M.; ORTIZ, Jesus D.; 'ssmith@springsgov.com'; Waters, Bret M.; WHITTINGTON, Scott A.; 'patriciabaxter@elpasoco.com'; 'JimReid@elpasoco.com'; 'Jason.arnold@usafa.af.mil'; 'sarah.nordstrom@cdps.state.co.us'; Blanchard, Tobi A.; Duran, Erin L.; Anderson, Mike; Skiffington-Blumberg, Sue; Johnson, Nancy; Miskel, Lori; Anderwald, Dick; Decapite, Curt; Sampley, Ken; Khattak, Saleem; 'charles.cambron@usafa.af.mil'; 'thomas.magneson@noaa.gov'; 'tim@pprbd.org'; 'guruljd@d11.org'; 'hayc@mscd.edu'; 'jeff.force@ppcc.edu'; 'larry.borland@asd20.org'; 'bfoltz@uccs.edu'; 'kjohnso9@uccs.edu'; 'rwhite2@uccs.edu'; DUBAY, Steven E; Bigelow, Lisa; Warnke, Greg; 'jglaven@springsgov.com'; Mayerl, James; 'cindy.corsaro@memorialhealthsystem.com'; 'frankie@epcms.org'; 'DavidLinebaugh@centura.org'; 'blmayfield@aol.com'; 'jwilliams@pparc.org'; 'clint.peterson@peakvista.org'; 'lisapowell@epchealth.org'; 'helenrogers@epchealth.org'; 'art.vigil@healthsouth.com'; Matthews, Curlie; Butcher, Paul; 'sue.crane-jennings@aeroflex.com'; Earle, Mark; McNair, Cam

Subject: Your Opinion is Important!

Greetings to all,

The Colorado Springs Office of Emergency Management is updating the City of Colorado Springs Pre-Disaster Mitigation Plan.

A critical piece of this update is your participation in a survey. Your answers will help us prioritize future work. While completing the survey, please limit the context of your thinking to the City of Colorado Springs. We value your individual perceptions of community risk. There is no right or wrong answer to the series of questions presented in the survey. Your individual responses will be held in confidence and results of this survey will be provided to you on request.

The survey can be found at http://www.zoomerang.com/Survey/?p=WEB229JUR3SBA9 Please complete the survey no later than September 11, 2009.

A sincere thank you for your help,

Bill Mills
Project Manager
Colorado Springs OEM
wmills@springsgov.com

Pre-disaster Mitigation Plan Update 2010
Public Outreach Strategy Status

Public survey completed 4th Quarter 2009

- 411 community members and 50 S M E's surveyed
- Community risk identified for Natural Hazards, Human Caused Hazards and Terrorism Threats

13 January 2010 Pikes Peak Area Council of Governments
http://ppacg.org/

- Board of Directors Briefing-Bret Waters
- Agenda is posted on the PPAC Website with comments directed to Bill Mills
- Draft plan will be posted on OEM website http://csoem.gov

25 January 2010 City Council

- Informal Council Briefing-Bret Waters
- City council is open to the public and the agenda is posted on the City Website with comments directed to Bill Mills
- Draft plan will be posted on OEM website for review

2 February 2010 Council of Neighborhood Organizations (CONO)
http://cscono.org/index.html

- General Membership Briefing-Bret Waters
- Presentation is on the agenda that is posted on the CONO website with comments directed to Bill Mills

16 February 2010 Community Briefing

- All comers briefing-Bret Waters
- Newspaper call in public notice section.
- Draft plan will be posted on OEM website for review with comments directed to Bill Mills

Pikes Peak Area
Council of Governments
Communities Working Together

MEETING AGENDA
BOARD OF DIRECTORS (BOARD)
March 10, 2010 – 9:00 a.m.
Main Conference Room

1. **CALL TO ORDER / ESTABLISH A QUORUM / INTRODUCTIONS**

2. **AGENDA APPROVAL**

3. **PUBLIC COMMENTS** - Items not on the Agenda

4. **CONSENT ITEMS** (These items will be acted upon as a whole, unless they are called for discussion by a Board member or a citizen wishing to address the Board.)
   A. Approval of the Minutes from the February 10, 2010, Regular Board Meeting
   B. Approval of Membership Appointments: CAC and CCOST

5. **COMMUNITY ADVISORY COMMITTEE REPORT**

6. **ACTION ITEMS**
   A. Site Application for Wakonda Hills Sewage Lift Stations
   B. FY 2008 - FY 2013 Transportation Improvement Program (TIP) Amendment #21

7. **INFORMATION ITEMS**
   A. Regional Emergency Response Plan Presentation – Bret Waters
   B. PPACG Area Agency on Aging Program Briefing: Senior Insurance Assistance Program
   C. A Discussion of State Transportation Advisory Committee Items
   D. American Reinvestment and Recovery Act (ARRA) 2 Project Prioritization

8. **COMMUNICATION ITEMS**
   A. February 11, 2010, *News Release*, Falcon Senior Services - Community Block Grant
   B. February 22, 2010, *Schriever Sentinel*, "State considers reclassifying Highway 94"
   C. April 16, 2010, Save the Date! Fort Carson Community Partnership Town Hall

9. **REPORTS**
   A. Executive Director's Report
   B. PPACG Financial Reports

10. **MEMBER ENTITY ANNOUNCEMENTS**

11. **MEETING SCHEDULE**

12. **ADJOURNMENT**

Pikes Peak Area
Council of Governments
Communities Working Together

MEMORANDUM

DATE: March 10, 2010

TO: PPACG Board of Directors

FROM: Robert MacDonald, Executive Director RFM

SUBJECT: Regional Emergency Response Plan Presentation: Bret Waters

ACTION REQUESTED: Information

The City of Colorado Springs' Division Manager of the Office of Emergency Management, Bret Waters, will provide a briefing to the PPACG Board of Directors on the activities of his group. This regional effort will highlight the following key topic areas:

PROJECT TYPES:

- Prevention
- Property Protection
- Public Education and Awareness
- Natural Resource Protection
- Emergency Services Protection
- Structural Projects

BENEFITS:

- Identifies community policies/actions for risk reduction
- Communicates priorities to state and federal officials
- Builds partnerships and efficiencies
- Helps institutionalize mitigation
- Creates sustainable, disaster resilient communities
- Achieves multiple community objectives
- Eligibility for Grant Program

Attachment:
PowerPoint Presentation

CITY OF COLORADO SPRINGS

We Create Community

Pre-Disaster Mitigation Plan

Bret Waters, Division Manager
City of Colorado Springs
Office of Emergency Management

Emergency Management Cycle

Mitigation is…

Sustained action taken to reduce or eliminate long-term risk to human life and property from natural and human caused hazards

Increasing Disaster Costs

Worldwide Natural Disaster Economic Losses						
Cost in Billions	$53.6	$93.3	$161.7	$262.9	$778.3	$420.6
Decade	1950s	1960s	1970s	1980s	1990s	2000-07

Disaster Mitigation Act of 2000

- Facilitates Local/State planning
- Requires a hazard mitigation plan
- Maintains eligibility for FEMA mitigation funds
- Enables effective risk reduction
- Rewards cooperation
- Promotes sustainability

Colorado Springs Mitigation Projects

Mitigation Funds received					
Year	2003	2005	2006	2007	2009
Project (Recipient)	Unmet Needs (OEM)	Landslide (OEM) North Cheyenne Canyon – (CSFD)	Stratton Open Space, Mt. St. Francis, UCCS – (CSFD)	Cottonwood Creek Project (Engineering) 7 Neighbor-hoods /Open Space (CSFD)	PDM Plan Update, Flood Mitigation Assistance Prepared-ness Guides, Weather Radios (OEM)
Amount $9,526,985	4,962,680	289,386	150,168	4,000,626	124,125

Examples of Mitigation Projects

- Prevention
- Property Protection
- Public Education and Awareness
- Natural Resource Protection
- Emergency Services Protection
- Structural Projects

Benefits of Mitigation Planning

- Identifies community policies/actions for risk reduction
- Communicates priorities to state and federal officials
- Builds partnerships and efficiencies
- Helps institutionalize mitigation
- Creates sustainable, disaster resilient communities
- Achieves multiple community objectives
- Eligibility for Grant Programs…
    - •Haz ard Mitigation
    - •Pre-Disaster Mitig ation
    - •Flood Mitig ation Assistance
    - •Repetitiv e Flood Claims
    - •Reduction of Severe Repetitive Loss

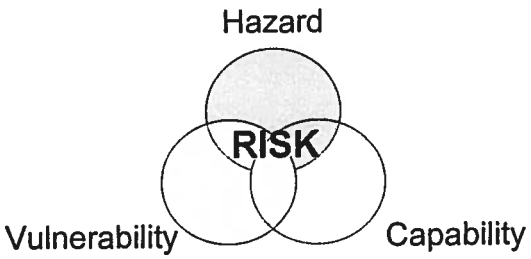
Plan Update 2010

- Ongoing Public Outreach Strategy

Requirement 44 CFR 201.6(b): the planning process shall include…an opportunity for public comment on the plan during drafting stage and prior to plan approval…

Risk Assessment

Risk: Intersection of Hazard, Vulnerability and Capability



FEMA Requirements

The risk assessment *shall* include descriptions of…

- The ***types of all natural hazards*** that can affect the jurisdiction [§201.6(c)(2)(i)].
- The ***location and extent*** of all natural hazards that affect the jurisdiction… [and] information on ***previous occurrences*** of hazard events and the ***probability of future hazard events*** [§201.6(c)(2)(i)].
- The jurisdiction's ***vulnerability*** to the hazards … include[ing] an overall summary of each hazard and its impact on the community [§201.6(c)(2)(ii)].

FEMA Recommendations

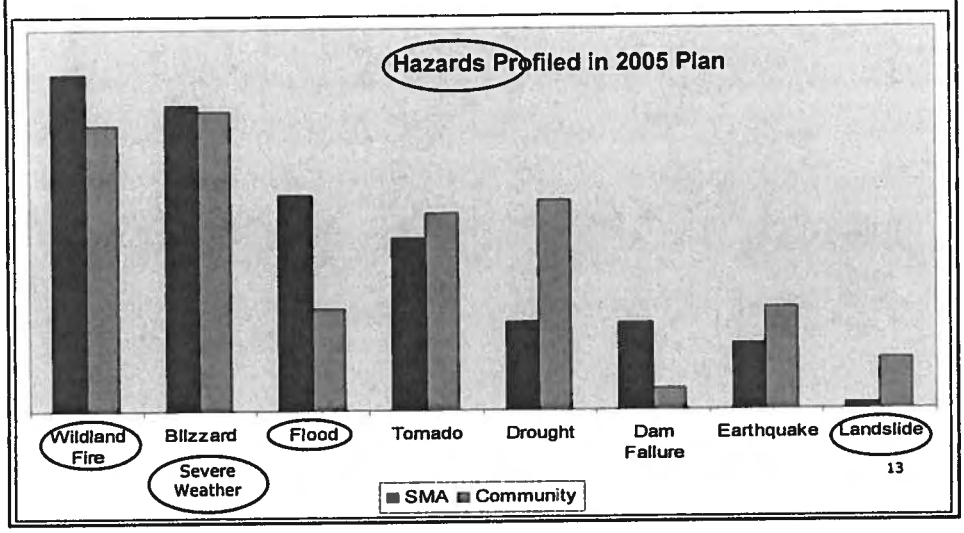
The risk assessment *should* describe vulnerability in terms of…

- The ***types and numbers of existing and future buildings, infrastructure, and critical facilities*** located in the identified hazard area. [§201.6(c)(2)(ii)(A)].
- An estimate of the ***potential dollar losses*** to vulnerable structures [§201.6(c)(2)(ii)(B)].
- ***A general description of land uses and development trends*** within the community so that mitigation options can be considered in future land use decisions. [§201.6(c)(2)(ii)(C)].

2005 Plan vs. Update

Perceived Threat of Natural Hazards, Colorado Springs, 2009

(Subject Matter Experts and Community Members)



2005 Plan vs. Update

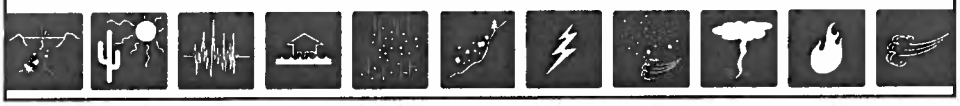
In the updated plan…

- Profiles a greater range of potential hazards (earthquake, dam failure, etc).
- More comprehensive lists of previous events.
- Better characterization of local risks (Colorado Springs or
- El Paso County) versus reliance on national statistics.
- Improved loss estimates.
- Capability assessment of existing City plans/policies/ procedures that mitigate the risks of hazards.

Identifying the Hazards

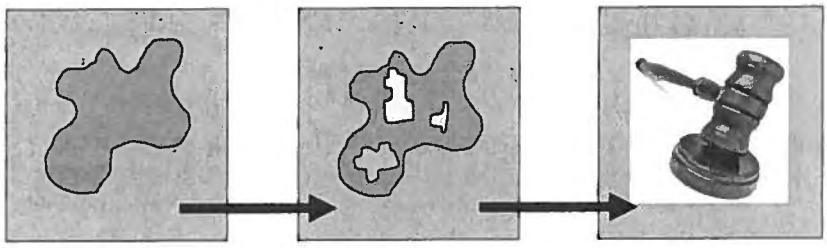
2005 PDM Plan	2010 Update
•Flood	•Dam and Levee Failure*
•Wildfire	•Drought
•Landslides	•Earthquake
•Severe Weather	•Flood
•Drought	•Hail
•Earthquake	•Landslide
	•Lightning
	•Severe Winter Storm
	•Tornado
	•Wildfire
	•Windstorm*
	•Human-caused hazards*

*New hazard profiles with update



Land Use & Development Analysis

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.



Define hazard areas → Review existing and future land uses → Develop regulations / mitigation actions

Next Steps

- Review Risk Assessment
- Internal Stakeholders
- Public Outreach
- Prepare Mitigation Strategy

CITY OF COLORADO SPRINGS
We Create Community

Public Outreach

Community Briefing, Public Invited

- February 16, 2010
  7:00 – 8:00 p.m.
  Fire Department Station 20
  6755 Rangewood Drive

Questions?

Bret Waters
bwaters@springsgov.com
(719) 385-5957

CITY OF COLORADO SPRINGS

We Create Community

INFORMAL AGENDA ITEM

COUNCIL MEETING DATE: January 25, 2009

TO: Honorable Mayor and Members of City Council

VIA: Penelope Culbreth-Graft, DPA - City Manager

FROM: Fire Chief Steven W. Cox

Bret Waters, Office of Emergency Management Division Manager

Subject Title: 2010 Colorado Springs Pre-Disaster Mitigation Plan Update Report

Strategic Goal (s) this item supports:

CITY SERVICES ECONOMIC VITALITY QUALITY OF LIFE

SUMMARY:

The Colorado Springs Office of Emergency Management (CSOEM) is providing a report on the 2010 Pre-Disaster Mitigation Plan (PDM) update for the City of Colorado Springs. The PDM is required to be eligible to receive federal mitigation grant funds and/or disaster recovery funds. The Federal Emergency Management Agency (FEMA) requires the PDM to be updated and approved every five years.

PREVIOUS COUNCIL ACTION:

City Council approved adoption of the Colorado Springs Pre-Disaster Mitigation Plan (PDM) during the April 26, 2005 Formal Council meeting. Through Resolution 185-09 (August 25, 2009), Council accepted grant funding of $66,825 from the State of Colorado, Department of Local Affairs, Division of Emergency Management to update the PDM for the City of Colorado Springs.

BACKGROUND:

The federal government has mandated that both state and local jurisdictions complete a PDM. The federal government has required the completion of the PDM for state and local jurisdictions to be eligible to receive federal disaster mitigation grant funds and/or disaster recovery funds. CSOEM contracted with a consultant in 2004 to develop the PDM plan. The plan was completed and submitted to both the State of Colorado and FEMA. After the review and revision process, the PDM plan received approval in 2005.

Federal requirements mandate that jurisdictional PDM plans be revised every five years. Because the plan was last updated and approved in 2005, CSOEM will complete the update and approval process for the latest version of the PDM plan in 2010. Colorado Springs must also conduct a public outreach strategy as outlined in Federal Requirement 44 CFR 201.6(b): the planning process shall include...an opportunity for public comment on the plan during drafting stage and prior to plan approval...

Since 2003, Colorado Springs has received $9,499,985 million in mitigation grant funding as a result of having a FEMA-approved PDM Plan.

FINANCIAL IMPLICATIONS: FEMA approval of the Colorado Springs 2010 PDM Plan update will allow the City of Colorado Springs to continue receiving federal disaster mitigation grant funds and/or disaster recovery funds

BOARD/COMMISSION RECOMMENDATION: None

STAKEHOLDER PROCESS: A defined stakeholder process, as outlined in federal guidelines, will be followed.

ALTERNATIVES: None. This is an informational report to City Council.

RECOMMENDATION: None. This is an informational report to City Council.

PROPOSED MOTION: None. This is an informational report to City Council.

cc: Sue Skiffington-Blumberg, Public Communications Manager

List of attachments for this item:

1. PowerPoint Presentation regarding the Pre-Disaster Mitigation Plan update.

Pre-Disaster Mitigation Public Briefing
CONO Meeting
March 2, 1010

Please Print

	Last Name	First Name	Signature	Representing (ex. HOA, other)	
1	HOOVER	RICK	R Hoover	RUSTIC HILLS	
2	GREER	BILL	W Greer	GEORGETOWN SQUARE	
3	MOORE	DOROTHY	Dorothy Moore	"	"
4	McVay	Karen	Karen A. McVay	Sunset Mesa Neighborhood	
5	LANCASTER	LIZ	Elizabeth A Lancaster	CRAGMOR VILLAGE N.A.	
6	CLARK	WELLING	Welling Clark	OWN (ORG WESTSIDE NEIGHBORS)	
7	COOL	Janice	Janice E. Cool	NECSNA	
8	COOL	Leroy	Leroy Cool	NECSNA	
9	BARBER	CHARLES	Charles Barber	Mid Palmer Park Blvd Neighborhood Assoc	
10	Bauer	Dennis	Dennis Bauer	Centennial Hills HOA	
11	KUSINAK	ARNE	Arne Kusinak	Guest	
12	Beasley	LARRY	Larry S Beasley	HOAFE	
13	Hankey	Kristin	Kristin Hankey	CS Utilities	
14	LITTLETON	PEGGY	Peggy Littleton	BOCC candidate	
15	NUWER	JOHN	[illegible]	AUSTIN HEIGHTS HOA	
16	EDWARDS	JIM	Jim Edwards	Country Club	
17	Willenbrock	CARL	Carl Willenbrock	" "	
18	VOGT	STEVE	[illegible]	SKYWAY	
19	Helm	Brandon	[illegible]	Wolf Ranch	
20	Cullen	Karen	Karen Cul	HD18	
21	Doran	Jan	Janice Doran	Discovery	
22	Rioth	Leonard	Leonard Rioth	Anderson, Dale Ridge Lobo	
23	Ham	Mike	Mike Ham	Soaring Eagles	
24	Barr	Susanne	Susanne Barr	Old Pioneer Trail	
25					

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We Create Community

Tell us what you think about our Pre-disaster Mitigation Plan.

Public comment is invited and encouraged on a draft of the City's Pre-Disaster Mitigation Plan update.

Community Briefing

Feb. 16, 7 p.m

Fire Station 20, 6755 Rangewood Dr.

The City prepares and updates plans to mitigate natural or man-made disasters before they happen and to be eligible to receive federal disaster mitigation grant and disaster recovery funds.

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Public comment encouraged on City's pre-disaster mitigatio plan update

Bret Waters

Public comment is invited and encouraged on a draft of the City of Colorado Springs' Pre-Disaster Mitigation Plan update. For this purpose, a community briefing will be held on Feb. 16, 7 p.m., at Fire Station 20, 6755 Rangewood Dr. in Colorado Springs.

The City prepares and updates plans to mitigate natural or man-made disasters before they happen. This helps the City prevent disasters such as wildfires along the wildland-urban interface on the west side of the City.

The completion and updating of such a plan every five years is also required by the federal government for the City to be eligible to receive federal disaster mitigation grant and disaster recovery funds.

Since 2003, the City has received nearly $9.5 million in mitigation grant funding. The City's plan was last updated and approved in 2005 so the City's Office of Emergency Management is completing an update of the plan for federal approval in 2010.

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For Immediate Release: Date **Contact:** Bret Waters, 385-5957

Public comment encouraged on City's pre-disaster mitigation plan update

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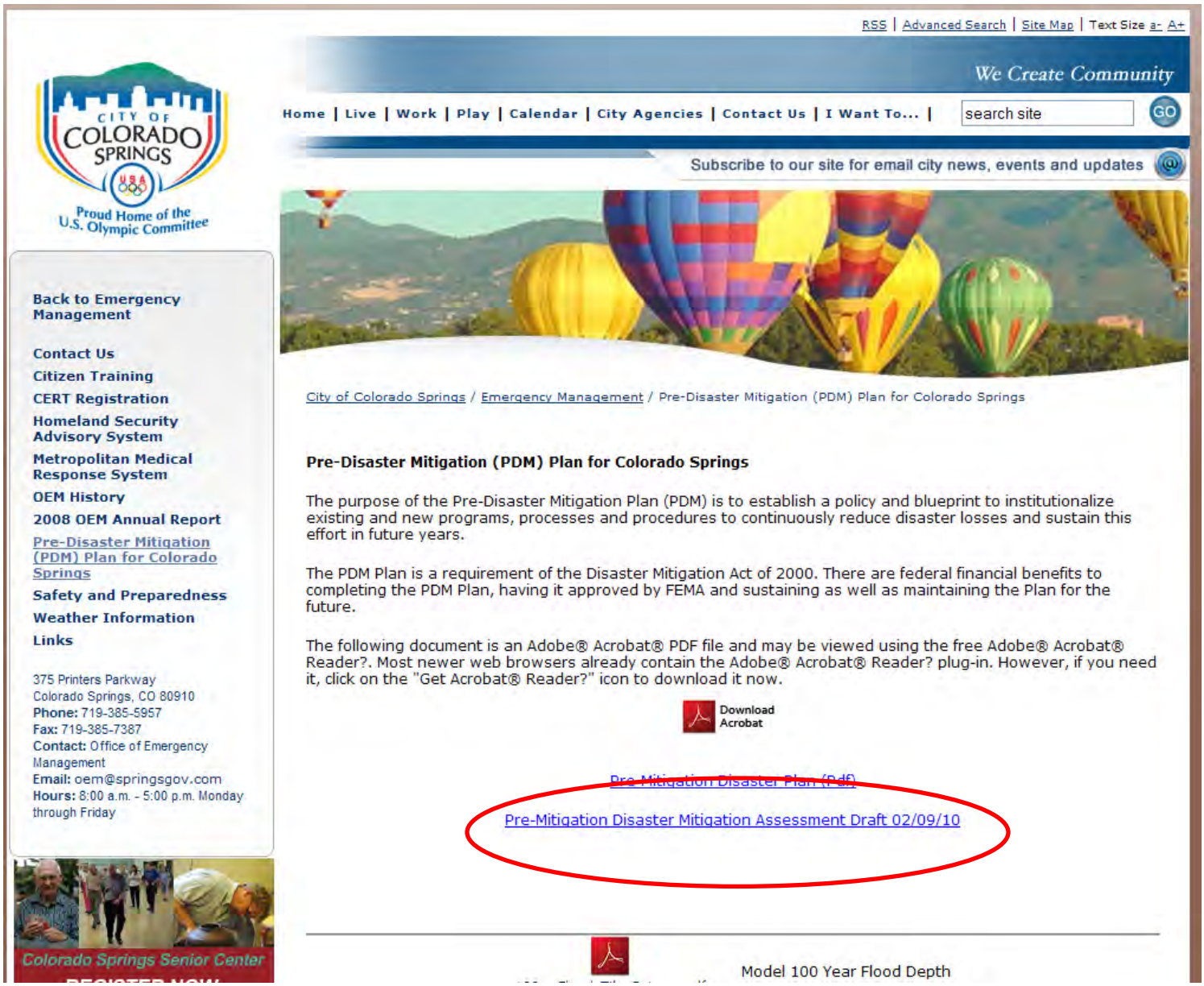
# # #

Screenshot taken 2-17-10
Draft Risk Assessment available on City website



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Colorado Springs, CO 80910
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Fax: 719-385-7387
Contact: Office of Emergency Management
Email: oem@springsgov.com
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Colorado Springs Senior Center

City of Colorado Springs / Emergency Management / Pre-Disaster Mitigation (PDM) Plan for Colorado Springs

Pre-Disaster Mitigation (PDM) Plan for Colorado Springs

The purpose of the Pre-Disaster Mitigation Plan (PDM) is to establish a policy and blueprint to institutionalize existing and new programs, processes and procedures to continuously reduce disaster losses and sustain this effort in future years.

The PDM Plan is a requirement of the Disaster Mitigation Act of 2000. There are federal financial benefits to completing the PDM Plan, having it approved by FEMA and sustaining as well as maintaining the Plan for the future.

The following document is an Adobe® Acrobat® PDF file and may be viewed using the free Adobe® Acrobat® Reader?. Most newer web browsers already contain the Adobe® Acrobat® Reader? plug-in. However, if you need it, click on the "Get Acrobat® Reader?" icon to download it now.

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Pre-Mitigation Disaster Plan (Pdf)

Pre-Mitigation Disaster Mitigation Assessment Draft 02/09/10

Model 100 Year Flood Depth

Appendix C – Mitigation Action Evaluation

CONTENTS:

1. Status of actions from original 2005 PDM Plan
2. Evaluation criteria for mitigation actions (STAPLEE)
3. Risk Assessment problem statements
4. Compiled list of potential mitigation actions by hazard
5. Colorado Springs mitigation goals, objectives, and action table

Mitigation Actions for Natural Hazards
Colorado Springs - 2005 PDM Plan

[Complete this column]

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
1	High	Continually assess on-going disaster preparedness programs and activities to implement changes that improve the disaster preparedness of the City.	All	OEM	Ongoing - Continual update of EOP and supporting plans. Implementing additional planning programs / efforts based on gaps (WebEOC, spec needs, CAT, COOP/COG, etc.)
2	High	Capitalize on and leverage existing programs, processes, procedures, organizations, agencies and other elements in executing a comprehensive Pre-Disaster Mitigation Program.	All	OEM	Ongoing - Wildfire mitigation, stormwater enterprise, streets.
3	High	In conjunction with preparedness activities, where feasible and cost-effective, initiate improvements to public safety, response and recovery programs and capabilities as additional	All	OEM	Developing damage assessment and debris removal portions of short/long-term recovery plan.
4	Medium	Assist in providing information and guidance to private property owners to provide them with the necessary information to make informed decisions regarding hazards in vicinity of their property and thereby enabling them to be part of the process in reducing the community's risk and vulnerabilities.	All	OEM	CSFD Wildfire mitigation program, CSFD communtiy education, Public Education emergency preparedness guide (complete), OEM preparedness and safety guide.
5	High	Continue to build a broad based grass roots knowledgeable community among the public, businesses, non-profit organizations, government and regulatory agencies and others by continuing to develop and enhance comprehensive public education programs related to preparedness and mitigation that improves awareness and provides the information necessary to recognize issues related to hazards, make informed decisions and take positive actions.	All	OEM	Annually attend multiple heath/safety fairs in the community and provide emergency management materials and provide displays of kits, etc.. Provide CERT training for memebers of the community.

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
6	High	Improve the disaster preparedness of the community by continuing to refine the comprehensive PDM Plan that incorporates objectives and activities to reduce the exposure of the community to future natural disasters. The City and its partners provide the resources to implement, sustain and maintain the PDM Plan including the programs and activities within the Plan.	All	OEM	Update PDM and strengthening flood portion (in progress).
7	High	Establish programs and activities and projects that address the hazards that have been identified in this Plan	All	OEM	Remove this strategy/action… this list is what this item reflects.
8	Medium	The City will leverage external financial aid and other available resources to the extent possible to strengthen its disaster resistance posture.	All	OEM, Fire Department, Public Works	Continue to pursue preparedness, project, and other grants and outside funding (ongoing).
9	High	Develop an acquisition program to acquire properties in or near hazardous locations that are affected by natural processes where the structure has been severely damaged, is no longer inhabitable or destroyed due to hazards from environmental or natural processes.	All	OEM	Engaged in buy-out mitigation grant related to unmet needs from Presidential Disaster 1276-DR.
10	High	Develop a long-term acquisition program that acquires structures located in known hazard zones (e.g. floodplain) with the acquisition occurring at some point in the future beyond the structure's economic life.	All	OEM	Engaged in buy-out mitigation grant related to unmet needs from Presidential Disaster 1276-DR.
11	Medium	Assist Colorado Springs Utilities to develop a PDM Plan, which includes critical utility infrastructure mapping.	All	CSU	N/A - This action item needs to be removed.
12	High	Continue efforts to improve the process for regulatory review of development and construction in vicinity of natural hazards as well as addressing these natural hazards.	All	OEM, City regulatory offices	City Development Review and Regional Building actively review permits relative to floodplain and require environmental assessments (ongoing)*
13	Medium	Continue to support a comprehensive natural hazards website that is a collection of various products and maps concerning a number of natural hazards that are of interest to the jurisdiction as well as to the public.	All	OEM	Select natural hazards are profiled on the OEM webpage with recommended actions to take before, during, and after an event. We do not have maps or other products on Web site but intranet site will provide additional data on hazards (ongoing).
14	Medium	Continue to strengthen, if necessary, existing policies and procedures that identify all natural hazard risks in the early planning stages of any project or proposed development.	All	OEM, City regulatory offices	Continue to review City Development Review and Regional Building actively review permits relative to floodplain and require environmental assessments. (unknown or not completed)

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
15	High	Continue to make improvements in the communication of Severe Weather Warnings, Flood Warning and related information.	All	OEM	Continued to use services such as contracted weather forecast and current condition point reports and maintenance of flood warning system in cooperation with county (ongoing).
16	Medium	Expand the capabilities of GIS systems and applications by assisting health departments and hospitals with surveillance and epidemiology functions Fire Department.	All	OEM, IT office	N/A-EPCDHE RESPONSIBILITY
17	High	Develop and implement plans for large-scale evacuations. Ensure a proactive public education component is developed and disseminated. Put a plan in place to implement the evacuation ordinance.	All	OEM	Current efforts underway to model WUI evacuation and develop street flow / mitigation actions to enhance vehicle flow. (in process) Concurrent effort on Special Needs evacuation in cooperation with county and NGOs.
18	High	Continue to develop the PDM in a deliberate long-term interactive process that draws in a diverse representation of stakeholders as well as the public. This requires extensive coordination over a long period of time in order to maximize the value of the process and allow all entities sufficient time to review, suggest improvements, prepare appropriate regulatory and other documents as well as integrate the products into the local jurisdiction's organizational and regulatory processes. This includes integration into the City's strategic plan, long-term plans, goals, objectives and planning documents. Timeframe is a minimum 24 months.	All	OEM	ONGOING-FISCAL CONSTRAINT - Goals / strategies were included in the OEM strategic plan.
19	Medium	Continue to coordinate for and seek improvements in the Community Rating System (CRS) rating for floodplain management to take the City from a rating of 9 to a rating of 7 in the CRS Program, which can be achieved by increasing the regulation of construction and other activity in the flood plain.	All	OEM	ONGOING-ADMINISTERED BY RBD
20	High	Assist the public to determine if their property is in or out of the flood plain. This is one of several services the local floodplain administration office provides.	Flood	Floodplain Administration Office	ONGOING-ADMINISTERED BY RBD

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
21	High	Perform a more detailed risk assessment of floods for the City. This should include a more accurate accounting for properties in the flood plain (i.e. field validation or inspection of parcels that have conflicting information in the databases), identify any potential life-safety issues, inventory debris sources, inventory potential hazardous material and potential water quality issues that may arise due to flooding, determine what critical community processes or functions may be disrupted and acquiring other important data to improve risk assessments as well as helping to identify where the priority of disaster response resources should go.	Flood	OEM	Currently ongoing as part of PDM update with FMA grant awared.
22	Medium	Inventory, upgrade and improve aging infrastructure that could be affected during a major disaster. Continue to develop and expand a program for identifying and documenting (via GIS and other automated means) problem drainage areas and developing a plan to monitor these sites during significant storm events. In addition, meet other FEMA criteria for performing detailed assessments, inventories, maintenance and other requirements pertaining to storm drainage systems. There is a collateral benefit to this in that it helps raise the score, for Community Rating System (CRS) purposes, and may improve the City's CRS rating, which in turn reduces flood insurance costs.	All	CSU, Public Works, OEM	In 2005, Colorado Springs Utilities initiated an enterprise initiative for Asset Management. The framework for this initiative is the International Infrastructure Management Manual (IIMM). The IIMM is at the root of many Federal infrastructure improvement projects. Components of this framework require a systematic inventory, condition assessment, and criticality ranking for all infrastructure in order to optimize and prioritize rehabilitation efforts. Colorado Springs Utilities is applying this framework to all four services. With respect to drainage ways, specific attention is applied to wastewater infrastructure known as "creek crossings", as well as "longitudinals" along creek banks. Rehabilitation efforts are not constrained to the infrastructure itself, creek improvements include construction of in-stream drop structures, bank rip-rap, and fortified abutments.
23	Medium	Develop a funding program for drainage and flood control projects, maintenance of drainage facilities as well as related studies.	Flood	OEM, Public Works	Stormwater Enterprise (2005-2009), ongoing?

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
24	Low	Investigate the feasibility of establishing a program for periodic clean-up of trash and other debris that is in the drainage ways/stream beds that can affect downstream structures in the event of a flood. This was a major problem during the 1935 flood and may have been a direct contributor to several deaths and additional damage.	Flood	OEM, Public Works	Unknown
25	Medium	While parcels have been identified as to whether they are in the floodplain little data is available for the value of contents, the indirect costs and total economic impact as a result of the loss of functions for all parcels. This was in the PDM guidance distributed by FEMA. The process and data will require time and other resources to collect and analyze to create decision- making information. Many interviews and on site visits will be required. In addition, there may be a large percentage of the population that will not participate. This should be a low priority for funding when compared to other critical tasks/actions. The cost to obtain this information is probably not worth the value of the information that may be obtained. What may be of value is to gather a list of critical infrastructure and critical functions performed by businesses or non-profits and other organizations along with data for public safety as stated in the previous activity.	Flood	OEM	Agree with assessment.
26	Medium	Perform new drainage basin studies, update drainage basin studies, review previous drainage basin studies and flood studies for recommendations that are still valid and make an assessment as to status and validity.	Flood	Public Works	Stormwater Enterprise (2005-2009) - ongoing?
27	High	Continue to develop programs and allocate resources for the reduction of fuels in potential wildfire areas. This includes continuing an educational FireWise program as well as organizing and providing resources that can be used to reduce natural fuels.	Wildland Fire	OEM, Fire Department	FireWise was continued and recently awared additional funding to continue/expand.

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
28	Medium	Investigate the development of partnerships with non-profits and other organizations for their assistance in implementing Wildfire Mitigation Plans and other hazard reduction programs. This would include investigating the establishment of a vegetation management enterprise capability; a non-profit or other organization to help senior citizens, families with significant physical limitations, governmental agencies, etc. to mitigate wildfire hazards (e.g. fuels).	Wildland Fire	OEM, Fire Department	Development of special needs evacuation planning and registry. (In process)
29	High	Continue the planned update of the 2001 Wildfire Mitigation Plan, including reassessments of parcels identified in the Wildland Urban Interface, as was previously done for the formulation of the Wildfire Mitigation Plan 2001	Wildland Fire	OEM, Fire Department	Ongoing process that will be covered in 2010 CWPP
30	High	Perform a more detailed analysis of Wildfire Risk Assessment for the City (either in conjunction with the update of the 2001 Wildfire Mitigation Plan or separately.	Wildland Fire	OEM, Fire Department	Ongoing process that will be covered in 2010 CWPP
31	Medium	Continue to investigate the adoption of National Fire Protection Association (NFPA) standard codes or other standards of good practice that are applicable to managing a program for wildland fire.	Wildland Fire	OEM, Fire Department	Ongoing process that will be covered in 2010 CWPP
32	Medium	While parcels have been assigned a wildfire hazard rating little data is available for the value of contents, the indirect costs and total economic impact as a result of the loss of functions for all parcels. What may be of value is to gather a list of critical infrastructure and critical functions performed by businesses or non-profits and other organizations along with data for public safety as identified in an earlier activity.	Wildland Fire	OEM, Fire Department	Real estate assessors data attachable to GIS parcel layer can provide some insight to type of business. Critical infrastructure definition and inventory is in process as part of catastrophic, PDM update, and continuity planning processes.
33	Medium	Continue to involve the Colorado Geological Survey in land reviews and hazard assessments.	Landslide	OEM, Planning office	Ongoing
34	High	Continue monitoring programs and support other monitoring programs for active landslides and slopes that show signs of potential failure.	Landslide	OEM	Ongoing

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
35	Medium	To the extent possible continue to encourage and or support initiatives and landslide research projects (either through in-kind contributions, providing data, GPS survey support, facilitating easy access to geological, geotechnical, geo-hazard and other related reports that are submitted to the City or support in other ways that are feasible).	Landslide	OEM, Fire Department	Engaged in buy-out mitigation grant related to unmet needs from Presidential Disaster X.
36	High	A future goal of this Pre-Disaster Mitigation Plan is to further explore and refine the identified loss reduction activities. Examples of continuing to refine the loss reduction activities are to explore the feasibility and benefit versus cost analysis of the current and future projects.	All	OEM, Fire Department, Public Works	FIRE DEPARTMENT: Presented Community Education programs for children, adults, and seniors Conducted fire safety code compliance inspections in existing public buildings Initiated process for the comprehensive risk analysis of community assets Provided advanced systems and procedures training for the building industry Performed technical research and analysis for development review Initiated Juvenile Fire setter Counseling Program Conducted Fire and Arson investigations New construction and fire protection system plan review and inspections Negotiated performance-based design work with local developers Administered a revocable permitting process, reviewed plans and conducted inspections Implemented a comprehensive Wildfire Risk Management program Administered a plan review and inspection process for hazardous materials and high pile stock Created a Tier II Hazardous Material reporting process Review, permit, and inspection of relevant hazardous activities Conducted fire safety code compliance inspections in existing public buildings

	Priority	Action	Hazards	Responsible Party	CURRENT STATUS
37	High	A future goal of Colorado Springs' mitigation strategy for severe weather will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs'. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	Severe Weather	OEM	ongoing
38	High	A future goal of Colorado Springs' mitigation strategy for landslide will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs' landslide prone areas. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	Landslide	OEM	GIS data overlays in place to generate this on demand.
39	High	A future goal of Colorado Springs' mitigation strategy for flooding will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs' floodplains.	Flood	OEM	GIS data overlays in place to generate this on demand.

Evaluation Criteria for Mitigation Actions

STAPLE/E Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, state, and federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, state, and federal laws

Other Considerations:

1. Current or potential support from the City Council
2. Local department or agency champion
3. Ability to be implemented during the 5-year lifespan of this version of the Plan
4. Ability to reduce expected future damages and losses (cost-benefit)
5. Value added to resiliency (of the City and its citizens)
6. "Low-lying fruit" projects (projects that are easy to develop, fund, implement, and close out)

PROBLEM STATEMENTS

Flood

- There are four repetitive loss properties
- There are only 1,067 NFIP policies
- Critical facilities in the floodplain
- CRS rating of 8 – could be increased

Wildfire

- There are nearly 24% of the City's parcels within the WUI
- Drought and Wind increase wildfire risk
- Future development increases risk, specifically west of I-25

Winter Storm

- Increased development may create accessibility issues in regard to road crews
- There are miles of overhead utilities
- Harsh winters with multiple storms deplete maintenance budgets (tough to predict)

Landslide

- Historical landslides could reactivate with heavy rains
- Thousands of structures at risk to landslide activity

Earthquake

- Lack of earthquake history provides false sense of security
- El Paso County has more bridges than any other in Colorado
- Structures over 100 years old exist throughout the City

Dam & Levee Failure

- Dam or Levee failure would leave large populations in devastation
- The Templeton Gap Floodway must meet additional capacity requirements to maintain USACE certification

Tornado

- Tornadoes come with little warning and exact location is tough to predict
- Locations of saferooms – is the public aware?
- Miles of above-ground utilities

Hail

- Magnitude and location of hailstorms is extremely difficult to predict

Lightning

- More cloud-to-ground lightning than most counties in Colorado
- Miles of above-ground utilities
- Lightning often causes fires
- Thousands of acres of open space, trails, parks, etc.

Windstorm

- Miles of above-ground utilities
- Areas with large mature trees
- Major windstorms fuel wildfires
- Windstorms are unpredictable and nearly impossible to mitigate
- Multiple structures over 100 years old

Drought

- Expected increases in population will place further demand on water supply
- Predicting periods of drought is next to impossible

Mitigation Actions: ALL HAZARDS

#	Action	Source
1	Continually assess on-going disaster preparedness programs and activities to implement changes that improve the disaster preparedness of the City.	2005 PDM Plan (1H)
2	Capitalize on and leverage existing programs, processes, procedures, organizations, agencies and other elements in executing a comprehensive Pre-Disaster Mitigation Program.	2005 PDM Plan (2H)
3	In conjunction with preparedness activities, where feasible and cost-effective, initiate improvements to public safety, response and recovery programs and capabilities as additional measures to further reduce the City's risk and vulnerability to a disaster.	2005 PDM Plan (3H)
4	Assist in providing information and guidance to private property owners to provide them with the necessary information to make informed decisions regarding hazards in vicinity of their property and thereby enabling them to be part of the process in reducing the community's risk and vulnerabilities.	2005 PDM Plan (4M)
5	Continue to build a broad based grass roots knowledgeable community among the public, businesses, non-profit organizations, government and regulatory agencies and others by continuing to develop and enhance comprehensive public education programs related to preparedness and mitigation that improves awareness and provides the information necessary to recognize issues related to hazards, make informed decisions and take positive actions.	2005 PDM Plan (5H)
6	Improve the disaster preparedness of the community by continuing to refine the comprehensive PDM Plan that incorporates objectives and activities to reduce the exposure of the community to future natural disasters. The City and its partners provide the resources to implement, sustain and maintain the PDM Plan including the programs and activities within the Plan.	2005 PDM Plan (6H)
7	The City will leverage external financial aid and other available resources to the extent possible to strengthen its disaster resistance posture.	2005 PDM Plan (8M)
8	Assist Colorado Springs Utilities to develop a PDM Plan, which includes critical utility infrastructure mapping.	2005 PDM Plan (11M)
9	Continue efforts to improve the process for regulatory review of development and construction in vicinity of natural hazards as well as addressing these natural hazards.	2005 PDM Plan (12H)
10	Continue to support a comprehensive natural hazards website that is a collection of various products and maps concerning a number of natural hazards that are of interest to the jurisdiction as well as to the public.	2005 PDM Plan (13M)
11	Continue to strengthen, if necessary, existing policies and procedures that identify all natural hazard risks in the early planning stages of any project or proposed development.	2005 PDM Plan (14M)
12	Continue to make improvements in the communication of Severe Weather Warnings, Flood Warning and related information.	2005 PDM Plan (15H)
13	Expand the capabilities of GIS systems and applications by assisting health departments and hospitals with surveillance and epidemiology functions Fire Department.	2005 PDM Plan (16M)
14	Develop and implement plans for large-scale evacuations. Ensure a proactive public education component is developed and disseminated. Put a plan in place to implement the evacuation ordinance.	2005 PDM Plan (17H)

#	Action	Source
15	Continue to develop the PDM in a deliberate long-term interactive process that draws in a diverse representation of stakeholders as well as the public. This requires extensive coordination over a long period of time in order to maximize the value of the process and allow all entities sufficient time to review, suggest improvements, prepare appropriate regulatory and other documents as well as integrate the products into the local jurisdiction's organizational and regulatory processes. This includes integration into the City's strategic plan, long-term plans, goals, objectives and planning documents. Timeframe is a minimum 24 months.	2005 PDM Plan (18H)
16	Inventory, upgrade and improve aging infrastructure that could be affected during a major disaster. Continue to develop and expand a program for identifying and documenting (via GIS and other automated means) problem drainage areas and developing a plan to monitor these sites during significant storm events. In addition, meet other FEMA criteria for performing detailed assessments, inventories, maintenance and other requirements pertaining to storm drainage systems. There is a collateral benefit to this in that it helps raise the score, for Community Rating System (CRS) purposes, and may improve the City's CRS rating, which in turn reduces flood insurance costs.	2005 PDM Plan (22M)
17	A future goal of this Pre-Disaster Mitigation Plan is to further explore and refine the identified loss reduction activities. Examples of continuing to refine the loss reduction activities are to explore the feasibility and benefit versus cost analysis of the current and future projects.	2005 PDM Plan (36H)

Mitigation Actions: DAM LEVEE FAILURE

#	Action	Source
1	Review dam and levee maintenance and inspection programs.	FEMA / Other
2	Develop and/or review flood warning system for dams.	FEMA / Other

Mitigation Actions: DROUGHT

#	Action	Source
1	Coordinate City programs and plans with the State Drought Plan.	FEMA / Other
2	Develop programs and regulations to prioritize water use, particularly during emergencies.	FEMA / Other
3	Develop programs and incentives that save water on an ongoing basis.	FEMA / Other
4	Develop contingency plans that help to anticipate needs and actions during a drought.	FEMA / Other
5	Review codes for water efficiency improvements.	FEMA / Other

Mitigation Actions: EARTHQUAKE

#	Action	Source
1	Develop school safety procedures for seismic events.	FEMA / Other
2	Survey schools and other critical facilities for seismic safety.	FEMA / Other
3	Confirm that current building codes are adequate to ensure seismic safety of new construction and retrofits.	FEMA / Other
4	Develop program to upgrade existing buildings and residences for seismic safety, and provide technical assistance to homeowners for seismic upgrades.	FEMA / Other
5	Develop program to train local architects, contractors and building officials about seismic safety provisions of building codes.	FEMA / Other
6	Map areas for seismic hazards including areas subject to liquefaction and land slides.	FEMA / Other

Mitigation Actions: FLOOD

#	Action	Source
1	Develop an acquisition program to acquire properties in or near hazardous locations that are affected by natural processes where the structure has been severely damaged, is no longer inhabitable or destroyed due to hazards from environmental or natural processes.	2005 PDM Plan (9H)
2	Develop a long-term acquisition program that acquires structures located in known hazard zones (e.g. floodplain), with the acquisition occurring at some point in the future, beyond the structure's economic life.	2005 PDM Plan (10H)
3	Continue to coordinate for and seek improvements in the Community Rating System (CRS) rating for floodplain management to take the City from a rating of 9 to a rating of 7 in the CRS Program, which can be achieved by increasing the regulation of construction and other activity in the flood plain.	2005 PDM Plan (19M)
4	Assist the public to determine if their property is in or out of the flood plain. This is one of several services the local floodplain administration office provides.	2005 PDM Plan (20H)
5	Perform a more detailed risk assessment of floods for the City. This should include a more accurate accounting for properties in the flood plain (i.e. field validation or inspection of parcels that have conflicting information in the databases), identify any potential life-safety issues, inventory debris sources, inventory potential hazardous material and potential water quality issues that may arise due to flooding, determine what critical community processes or functions may be disrupted and acquiring other important data to improve risk assessments as well as helping to identify where the priority of disaster response resources should go.	2005 PDM Plan (21H)
6	Develop a funding program for drainage and flood control projects, maintenance of drainage facilities as well as related studies.	2005 PDM Plan (23M)
7	Investigate the feasibility of establishing a program for periodic clean-up of trash and other debris that is in the drainage ways/stream beds that can affect downstream structures in the event of a flood. This was a major problem during the 1935 flood and may have been a direct contributor to several deaths and additional damage.	2005 PDM Plan (24L)
8	While parcels have been identified as to whether they are in the floodplain little data is available for the value of contents, the indirect costs and total economic impact as a result of the loss of functions for all parcels. This was in the PDM guidance distributed by FEMA. The process and data will require time and other resources to collect and analyze to create decision- making information. Many interviews and on site visits will be required. In addition, there may be a large percentage of the population that will not participate. This should be a low priority for funding when compared to other critical tasks/actions. The cost to obtain this information is probably not worth the value of the information that may be obtained. What may be of value is to gather a list of critical infrastructure and critical functions performed by businesses or non-profits and other organizations along with data for public safety as stated in the previous activity.	2005 PDM Plan (25M)
9	Perform new drainage basin studies, update drainage basin studies, review previous drainage basin studies and flood studies for recommendations that are still valid and make an assessment as to status and validity.	2005 PDM Plan (26M)
10	A future goal of Colorado Springs' mitigation strategy for flooding will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs' floodplains.	2005 PDM Plan (39H)

Mitigation Actions: FLOOD

#	Action	Source
11	Channel improvements including widening, relocation, and stabilization (lining, drop structures, bench areas, regrading/revegetating, etc.). (Bear Creek, Black Squirrel Creek, Monument Branch, Monument Creek, Sand Creek, Smith Creek)	City Plan / Study
12	Annual debris removal to maintain channel and crossing capacity. (Bear Creek, Dirty Woman Creek, Sand Creek, Jimmy Camp Creek)	City Plan / Study
13	Bridge/culvert replacement to mitigate overtopping/flooding in problem spots and along evacuation routes.	City Plan / Study
14	Construct or upgrade regional/subregional detention ponds. (Black Forest, Black Squirrel Creek, Jimmy Camp Creek, Monument Branch)	City Plan / Study
15	Upgrade existing irrigation diversion ditch to provide additional capacity. (Black Forest)	City Plan / Study
16	Floodplain preservation. (Dirty Woman Creek, Sand Creek)	City Plan / Study
17	Provide 100 ft. buffer zone along creek banks. (Jimmy Camp Creek)	City Plan / Study
18	Construct public and private on-site detention ponds. (Smith Creek)	City Plan / Study
19	Develop a critical facilities floodplain ordinance.	FEMA / Other
20	Acquire properties in the floodplain.	FEMA / Other
21	Designate a safe zone for flood evacuation for City Parks and Recreation areas.	FEMA / Other
22	Institute a community assisted floodproofing program for community and private facilities.	FEMA / Other
23	Implement flood forecasting and warning enhancements for key flood drainages.	FEMA / Other
24	Develop a flood warning system.	FEMA / Other
25	Feasibility study on rain gauge automation. (GARR System)	FEMA / Other

Mitigation Actions: HAIL

#	Action	Source
1	A future goal of Colorado Springs' mitigation strategy for severe weather will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	2005 PDM Plan (37H)
2	Educate community, builders, and architects about construction practices and materials that minimize hail damage (such as roofing and exterior wall systems)	FEMA / Other

Mitigation Actions: LANDSLIDE

#	Action	Source
1	Develop an acquisition program to acquire properties in or near hazardous locations that are affected by natural processes where the structure has been severely damaged, is no longer inhabitable or destroyed due to hazards from environmental or natural processes.	2005 PDM Plan (9H)
2	Develop a long-term acquisition program that acquires structures located in known hazard zones, with the acquisition occurring at some point in the future beyond the structure's economic life.	2005 PDM Plan (10H)
3	Continue to involve the Colorado Geological Survey in land reviews and hazard assessments.	2005 PDM Plan (33M)
4	Continue monitoring programs and support other monitoring programs for active landslides and slopes that show signs of potential failure.	2005 PDM Plan (34H)
5	To the extent possible continue to encourage and or support initiatives and landslide research projects (either through in-kind contributions, providing data, GPS survey support, facilitating easy access to geological, geotechnical, geo-hazard and other related reports that are submitted to the City or support in other ways that are feasible).	2005 PDM Plan (35M)
6	A future goal of Colorado Springs' mitigation strategy for landslide will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs' landslide prone areas. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	2005 PDM Plan (38H)
7	Map areas for landslides and seismic hazards, including areas subject to liquefaction and land slides.	FEMA / Other
8	Adopt more stringent planning and construction standards for hillside development.	FEMA / Other
9	Adopt a geologic hazards overlay zone that requires more detailed analysis prior to any construction activity. Coordinate this with more stringent codes and requirements for construction in geologic hazard areas.	FEMA / Other
10	Place utilities outside landslide prone areas.	FEMA / Other

Mitigation Actions: LIGHTNING

#	Action	Source
1	A future goal of Colorado Springs' mitigation strategy for severe weather will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs'. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	2005 PDM Plan (37H)
2	Produce and distribute information about safe behavior during lighting events.	FEMA / Other
3	Post warning signs about lightning hazards and safe behavior in parks, golf courses and open spaces.	FEMA / Other

Mitigation Actions: SEVERE WINTER STORM

#	Action	Source
1	A future goal of Colorado Springs' mitigation strategy for severe weather will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs'. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	2005 PDM Plan (37H)
2	Produce and distribute family and traveler emergency preparedness information for winter weather hazards.	FEMA / Other
3	Include safe winter driving strategies for severe winter weather events in driver education classes and materials.	FEMA / Other
4	Identify and stock shelters for residents and travelers for use during severe winter storms.	FEMA / Other
5	Develop an outreach plan to systematically contact isolated, vulnerable or special needs populations during severe winter storm events.	FEMA / Other
6	Consider using snow fences to limit or control snow drifting along critical roadway segments.	FEMA / Other

Mitigation Actions: TORNADO

#	Action	Source
1	A future goal of Colorado Springs' mitigation strategy for severe weather will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs'. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	2005 PDM Plan (37H)
2	Develop and review tornado warning system.	FEMA / Other
3	Produce and distribute preparedness information related to tornados, including emergency procedures and use of safe rooms.	FEMA / Other
4	Confirm that current building codes are adequate to ensure safety of new construction and retrofits for tornadoes and severe wind events.	FEMA / Other
5	Develop a program to train local architects, contractors and building officials about tornado and severe wind safety provisions of building codes.	FEMA / Other
6	Review conditions of manufactured/mobile homes for tornado and severe wind safety.	FEMA / Other
7	Develop an outreach plan to systematically contact isolated, vulnerable or special needs populations prior to tornado and extreme wind events.	FEMA / Other

Mitigation Actions: WILDFIRE

#	Action	Source
1	Continue to develop programs and allocate resources for the reduction of fuels in potential wildfire areas. This includes continuing an educational FireWise program as well as organizing and providing resources that can be used to reduce natural fuels.	2005 PDM Plan (27H)
2	Investigate the development of partnerships with non-profits and other organizations for their assistance in implementing Wildfire Mitigation Plans and other hazard reduction programs. This would include investigating the establishment of a vegetation management enterprise capability; a non-profit or other organization to help senior citizens, families with significant physical limitations, governmental agencies, etc. to mitigate wildfire hazards (e.g. fuels).	2005 PDM Plan (28M)
3	Continue the planned update of the 2001 Wildfire Mitigation Plan, including reassessments of parcels identified in the Wildland Urban Interface, as was previously done for the formulation of the Wildfire Mitigation Plan 2001	2005 PDM Plan (29H)
4	Perform a more detailed analysis of Wildfire Risk Assessment for the City (either in conjunction with the update of the 2001 Wildfire Mitigation Plan or separately).	2005 PDM Plan (30H)
5	Continue to investigate the adoption of National Fire Protection Association (NFPA) standard codes or other standards of good practice that are applicable to managing a program for wildland fire.	2005 PDM Plan (31M)
6	While parcels have been assigned a wildfire hazard rating little data is available for the value of contents, the indirect costs and total economic impact as a result of the loss of functions for all parcels. What may be of value is to gather a list of critical infrastructure and critical functions performed by businesses or non-profits and other organizations along with data for public safety as identified in an earlier activity.	2005 PDM Plan (32M)
7	Wildfire protection projects in the 30 parks and open spaces that have wildland characteristics or are located in the wildland urban interface.	City Plan / Study
8	Wildfire protection projects (fuels management and/or neighborhood chipping) in some of the 59 common owned areas and open spaces on private, state, non-profit and county properties that have wildland characteristics or are located in the wildland urban interface.	City Plan / Study
9	Assistance available to homeowners for mitigation around their homes as funding is available. Emphasis and priority given to seniors or homeowners with special needs. Individual stewardship agreement required before work is done on private property.	City Plan / Study
10	Social Media: Utilize social media sites regarding projects, neighborhood events, photo gallery and wildfire updates. Add information and updates to several social media sites: Twitter, flickr, myspace and Wikipedia. Updates for wildfire incidents with perimeter map, acreage, structures, fire behavior information, committed resources…	City Plan / Study
11	Grass Fire Educational Program: Future planning for community education and outreach includes an educational message that addresses grass fires.	City Plan / Study
12	Pile Burning: Reintroduce fire to the ecosystem in remote areas of City-owned parks and open spaces.	City Plan / Study
13	Design, build and install manual fire danger signs for the WUI stations and recognized Firewise Neighborhoods.	City Plan / Study
14	Firewise Community Recognition: Apply for Firewise recognition for neighborhoods meeting the $2 per capita requirements, including chipping, volunteer hours and fuels mitigation. Goal is to add 1-2 neighborhoods annually.	City Plan / Study

Mitigation Actions: WILDFIRE

#	Action	Source
15	Support funding for a slash/mulch program for clearing private properties and providing community drop off for materials.	FEMA / Other
16	Work with State and County Departments of Transportation to establish signage along principle evacuation routes.	FEMA / Other
17	Encourage landowners adjacent to escape routes to participate in thinning programs to increase the safety of the escape routes.	FEMA / Other

Mitigation Actions: WINDSTORM

#	Action	Source
1	A future goal of Colorado Springs' mitigation strategy for severe weather will be to further assess and accurately quantify the total number of person and structures that are vulnerable within Colorado Springs'. This goal will be included within the plan maintenance of the Pre-Disaster Mitigation Plan and will be accomplished in future revisions utilizing FEMA 386-2 "Understanding Your Risks."	2005 PDM Plan (37H)
2	Confirm that current building codes are adequate to ensure safety of new construction and retrofits for tornadoes and severe wind events.	FEMA / Other
3	Develop program to train local architects, contractors and building officials about tornado and severe wind safety provisions of building codes.	FEMA / Other
4	Review conditions of manufactured/mobile homes for tornado and severe wind safety.	FEMA / Other
5	Develop an outreach plan to systematically contact isolated, vulnerable or special needs populations prior to tornado and extreme wind events.	FEMA / Other

Goals		Objectives		Actions	Priority	Responsible Party	Estimated Timeframe	Estimated Costs	Funding Sources
Goal 1: Reduce or eliminate the exposure to property damage, injury or loss of life, and damage to the natural environment caused by natural hazards.	**A**	Identify and initiate improvements to public safety, response, and recovery programs to reduce risk and vulnerability.	**A-1**	Upgrade aging infrastructure such as transportation, drainage, utilities, and others that could be affected during a major natural disaster.	LOW	OEM and Engineering	5 years	Unfunded CIP Top Priority Projects Templeton Gap - $5,000,000 per CIP Fountain Creek downstream of Monument Creek- $5,450,000 per CIP Roadway Infrastructure- $28,000,000 annually per CIP Concrete Infrastructure - $9,000,000 annually per CIP *several other projects both funded and unfunded identified in 2010 CIP	general fund/grant; RTA for roadway projects; CSU for wastewater, water, electric infrastructure.
			A-2	Evaluate repetitive loss properties and potential solutions to mitigate existing conditions.	LOW	OEM	5 years	Staff time	general fund/grant
			A-3	Update and maintain the Jimmy Camp Creek and Cottonwood Creek Drainage Basin Planning Studies.	MEDIUM	Engineering	3 years	A portion of $211,640 per CIP	JCC - developer cost; CC using SWENT funds
			A-4	Evaluate funding alternatives to achieve United States Army Corps of Engineers (USACE) certification of the Templeton Gap Floodway (levee).	LOW	Engineering	3 years	Staff time	potential grant to upgrade levee or won't obtain certification
	B	Follow through with and leverage existing organizations, programs, and procedures to implement the PDM Program.	**B-1**	Continue to expand the capabilities and participation of the Emergency Management Committee and Volunteer Committee.	HIGH	OEM	Ongoing	Staff time	general fund/grant
			B-2	Develop a strategy to integrate the PDM plan with the City's strategic plan and other long-term planning documents.	MEDIUM	Planning	2 years	Staff time	general fund/grant
			B-3	Complete GIS and other automated inventories for stormwater, problem drainage areas, DFIRM and other City assets.	LOW	Engineering	5 years		
			B-4	Coordinate with Colorado Springs Utilities to review their current water conservation and drought programs.	HIGH	CSU and OEM	5 years	Staff time	general fund/grant
			B-5	Achieve and maintain a Class 6 rating in the Community Rating System (CRS) for floodplain management.	HIGH	PPRBD and OEM	5 years	Staff time	already funded
			B-6	Review the Emergency Action Plans provided by Colorado Springs Utilities.	HIGH	OEM and CSU	5 years	Staff time	general fund/grant
			B-7	Attend Emergency Action Plan exercises coordinated by Colorado Springs Utilities.	HIGH	OEM and CSU	5 years	Staff time	
			B-8	Continue to develop programs and allocate resources for the reduction of fuels in potential wildfire areas. This includes continuing the Wildfire Mitigation program as well as organizing and providing resources that can be used to reduce natural fuels.	HIGH	WM-Division of FM	Ongoing (FY 2010-2020)	$80-113k annually	PSST/ Grants
			B-9	Continue to develop partnerships with other organizations to implement wildfire mitigation plans and other hazard reduction programs.	MEDIUM	WM-Division of FM	Ongoing (FY 2010-2020)	Not applicable	PSST
			B-10	Complete and maintain the 2010 Community Wildfire Protection Plan including the assessment of parcels identified in the Wildland Urban Interface.	HIGH	WM-Division of FM	CWPP by June 2010	Staff Salary $17,500	PSST
			B-11	Implement the actions identified in the 2010 Community Wildfire Protection Plan.	HIGH	WM-Division of FM	Ongoing (FY 2010-2020)	$300k annually	PSST / Grants
			B-12	Work with the State Division of Water Resources to evaluate the dams that are not managed by Colorado Springs Utilities to determine high or significant impact and current conditions.	MEDIUM	OEM	2 years	Stafft time	general fund/grant
	C	Build upon existing public outreach efforts to reduce risk and vulnerability to natural hazards.	**C-1**	Collaborate with other stakeholders (public, businesses, non-profit organizations, government and regulatory agencies, and others) for public outreach efforts.	MEDIUM	OEM	5 years	Staff time	general fund/grant
			C-2	Restructure the public outreach strategy to share responsibilities amongst the citizens, federal, state, and local governments.	HIGH	OEM	2 years	Staff time	general fund/grant

Goals		Objectives		Actions	Priority	Responsible Party	Estimated Timeframe	Estimated Costs	Funding Sources
			C-3	Continue to operate the City's Department of Emergency Management natural hazards website.	LOW	OEM	ongoing	Staff time	general fund/grant
			C-4	Incorporate earthquakes in the Office of Emergency Management public outreach strategy.	LOW	OEM	2 years	Staff time	general fund/grant
	D	Leverage external financial assistance and other resources to strengthen the City's disaster resiliency.	**D-1**	Pursue additional grants to implement risk reduction projects.	HIGH	OEM	ongoing	Staff time	general fund/grant
	E	Continue to improve the regulatory review process for development and construction in the vicinity of known natural hazard areas.	**E-1**	Continue to involve the Colorado Geological Survey in land use reviews and hazard assessments.	LOW	Planning	ongoing	Staff time	general fund/grant
	F	Continue to assess ongoing disaster preparedness programs that maintain or improve City preparedness.	**F-1**	Maintain Emergency Management Accreditation Program certification.	HIGH	OEM	ongoing	Staff time	general fund/grant
			F-2	Ensure the effectiveness of large-scale evacuation plans through full-scale tests.	HIGH	OEM	ongoing	Staff time	general fund/grant
			F-3	Maintain the programs and data outlined in the Special Needs Assessment and Plan.	HIGH	OEM	ongoing	Staff time	general fund/grant
			F-4	Develop preparedness guides for Colorado Springs residents and businesses.	HIGH	OEM	1 year	Staff time	general fund/grant
			F-5	Continue to improve the communication of severe weather warnings, flood warning, and related information.	HIGH	OEM	ongoing	Staff time	general fund/grant
			F-6	Prepare a feasibility study on updating the City's rain gauge automation system to the Gauge-Adjusted Radar Rainfall (GARR) System.	HIGH	OEM	2 years	$20,000	general fund/grant
			F-7 NEW	Consider the use of a resource management system to capture the financial data for natural hazard events.					

Appendix D – Plan Maintenance Forms

CONTENTS:

1. Mitigation action progress worksheet
2. Mitigation plan annual review questionnaire

Mitigation Action/Project Progress Report			
Progress Report Period From (date):		**To (date):**	
Project Title:			
Project Plan ID:			
Responsible Agency:			
Contact Name:			
Contact Number/E-mail:			
Project Status: **Completed, Uncompleted, Ongoing?**			
Anticipated Completion Date:			

Summary of Project Progress for this Reporting Period
1. What was accomplished for this project during this reporting period?
2. What obstacles, problems, or delays did the project encounter, if any?
3. If uncompleted, is the project still relevant? Should the project be changed or revised?
4. Other comments

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Mitigation Plan Annual Review Questionnaire		
Plan Chapter	**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?	
RISK ASSESSMENT	Has a natural and/or man-made disaster occurred?	
	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?	
VULNERABILITY ANALYSIS	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?	

Mitigation Plan Annual Review Questionnaire		
Plan Chapter	**Considerations**	**Explanation**
	Are there repetitive losses and/or severe repetitive losses to document? Has NFIP participation changed in the participating jurisdictions?	
CAPABILITY ASSESSMENT	Are there different or additional technical, financial, and human resources available for mitigation planning?	
	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
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 Implementation Strategy? Should existing mitigation actions be 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?	
PLAN MAINTENANCE PROCESS	Was the plan monitored and evaluated as anticipated?	
	Have elements of the plan been incorporated into other planning mechanisms?	

Appendix E – Human-Caused Hazards Summary

CONTENTS:

1. Human-caused hazards summary

Human Caused Hazards

The PDM Update primary focus is to assess and provide mitigation strategies for natural hazards. To ensure continuity in future planning work, such as, Catastrophic Planning the PDM update seeks to introduce Terrorism/Human Caused hazards into the PDM planning cycle. (FEMA State and Local Guidance for Integrating Man Caused Hazards into Pre-Disaster mitigation planning 2003, version 2)

A catastrophe should not be misunderstood as a synonym for disaster or emergency. Catastrophe is defined as: "A state of extreme (usually irremediable) ruin and misfortune; a momentous tragic event ranging from extreme misfortune to utter overthrow or ruin". The definition of a Catastrophic Incident for the PDM and other tangential plans is based on FEMA guidance and is as follows:

> *Any natural or manmade incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, and/or 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 list below illustrates the human caused hazards facing Colorado Springs as discussed and decided upon by the Catastrophic Planning Sub-Committee during the Catastrophic Incident Planning Process.

TERRORISM AND HUMAN CAUSED HAZARDS
Explosion
Chemical, Biological, Radiological, Nuclear and Explosion (CBRNE) - Chemical (all)
CBRNE - Biological (all)
CBRNE – Radiological
Cyber
Disease – Infectious Disease

This list was evaluated by the Catastrophic Planning Sub-Committee and the Emergency Management Committee to validate those hazards with a likelihood of occurrence with a significant impact to city operations. There are many similar characteristics of human caused hazards that will be detailed here, in addition to the specific characteristics of each hazard as detailed below.

Because many human caused hazards are no notice events, early focus on coordinated response and recovery efforts is imperative to mitigate damage and impact to the public. Many human caused hazards will require extended response and recovery operations. Initially following any incident, it may be assumed that terrorism is the cause until proven otherwise. As this occurs, there will be a two pronged response that involves the typical response and recovery operations in addition to the law enforcement investigation to determine the cause. Should terrorism be determined, the typical response and recovery operations will be coupled with a federal terrorism investigation. Additional considerations for a terrorism event include preservation of human evidence in addition to evidence collection and crime scene preservation.

Depending upon the location of the hazard event, critical infrastructure including power, water, waste water and gas may be severely impacted, causing major disruption to the citizens of Colorado Springs.

For all events, it is anticipated that the response and recovery will deplete local resources and additional resources will be required to successfully meet the needs of the response and recovery efforts. In line with resource depletion, considerations for continuity of government and continuity of operations must be addressed. Casualties are expected in any terrorism or human caused hazard event.
Due to the unique nature of human caused events, there will be special public communications requirements to ensure the public receives risk and crisis communications and to mitigate any public unrest or incitement.

The Explosion hazard is the result of an explosive weapon detonated by impact, proximity to an object, a timing mechanism, or other means meant to intimidate or coerce civilian populations or governments, or any segment thereof, in furtherance of political or social objectives. This hazard is assumed to be an act of terrorism until otherwise determined and likely results in compromised structures and mass casualties/fatalities. It encompasses ongoing investigation and response operations. Although there are no historical explosive terrorist events within the City of Colorado Springs and surrounding area, a recent poll of subject matter experts assessed the potential likelihood and impact of an explosive terrorist event in comparison to other potential hazards. It is believed at this time, that the likelihood of this occurring is unlikely with a less than one percent chance of occurring in the next year.

CRBNE – Chemical is another hazard facing Colorado Springs with significant effects. This hazard is also most likely related to an act of terrorism and would result in mass casualties/fatalities with long standing affects on critical infrastructure and essential services. The decision to evacuate and/or shelter-in-place would be a major issue during an incident of this nature and be dependent upon the agent. Although there are no historical chemical terrorist events within the City of Colorado Springs and surrounding area, the potential likelihood and impact of an explosive terrorist event in comparison to other potential hazards is estimated at between a 1-10 percent chance of occurrence in the next year.

The CBRNE – Biological hazard or Biological terrorist attacks utilize disease causing agents to cause mass casualties or to disrupt economic, military, and political activity. Biological agents can be utilized as a weapon to cause harm, intimidate and/or coerce civilian populations or governments, or any segment thereof, in furtherance of political or social objectives. The primary hazard effects of biological agents will be direct physical harm to personnel with some effects being realized immediately and some with delayed onset based on exposure and delivery mechanisms. Secondary effects include social impacts based on the event including mass casualties, disruption of regular city services (localized or widespread), panic, interruption of economic and tourist activities, stresses on the local medical functions and reduction in response and recovery capabilities. Although there are no historical biological terrorist events within the City of Colorado Springs and surrounding area, there are recent documented events within the United States which lends this hazard to being a significant threat in the near future.

CBRNE – Radiological or a radiological attack, most often by a radiological dispersal device or “dirty bomb”, is the use of common explosives to spread radioactive material in proximity to a densely populated area. The primary effects of a terrorism radiological event are physical damage of property (from localized damage to large-scale infrastructure damage) and death/casualties within proximity to the initial attack. Most injuries from a dirty bomb occur from the heat, debris, radiological dust, and force of the conventional explosion used to disperse the radioactive material and would result in a surge on local medical facilities and capabilities. Long term hazard effects include the impact of radiation sources on local population as well as exposure to surrounding infrastructure. There are currently no recorded radiological terrorist events

within the City of Colorado Springs or surrounding area and the likelihood of this happening is unlikely with less than a one percent chance of occurrence in the next year.

Cyber attacks are the unlawful and deliberate use, modification, disruption or destruction of computing resources intended to intimidate or coerce civilian populations and threaten lives, property, security and the economy. A Cyber Attack can cause widespread disruption and damage by attacking our electronic and computer networks, which are linked to other critical infrastructures such as our energy, financial, and security networks. These computer networks control physical objects such as electrical transformers, trains, pipeline pumps, chemical vats, water systems, radars, etc., all of which exist beyond cyberspace. One key hazard effect of cyber attacks is the potential for economic damage and disruption. There are continual cyber incidents affecting the city of Colorado Springs and surrounding area at varying degrees. Subject matter experts agreed that a cyber event caused by terrorism might likely occur with a 10-100 percent chance in the next year and a recurrence interval of 10 years or less.

Infectious Disease is a disease caused by a microorganism or other agent, such as a bacterium, fungus, or virus that enters the body of an organism and is usually contagious in origin that is usually transmitted by a specific kind of contact with an infected entity or object and rapidly increases in geographic range. Some well known infectious diseases include Ebola virus, HIV/AIDS, Hepatitis, Influenza, measles, and chicken pox. The susceptibility to an infectious disease can be universal and widespread over a large geographic area. Although treatments such as antibiotics, antiviral, antifungal and anti-parasitic could serve to prevent or lessen the effects of an infectious disease there is still the possibility of significant harm to populations to include the potential for mass fatalities. The occurrence of an infectious disease cannot be predicted with certainty but the State of Colorado has experienced four notable infectious disease outbreaks in the past. The potential likelihood of an infectious disease event affecting Colorado Springs is estimated at about 4% each year with a recurrence interval of 11 to 100 years.

Appendix G - References

CONTENTS:

1. Defined acronyms
2. Sources consulted
3. Web resources
4. HAZUS Methodology

DEFINED ACRONYMS

BFE	Base Flood Elevation
BLM	Bureau of Land Management
BOCC	Board of County Commissioners
CAIC	Colorado Avalanche Information Center
CDEM	Colorado Division of Emergency Management
CDOT	Colorado Department of Transportation
CEI	Continuing Eligibility Inspections
CERT	Citizen Emergency Response Training
CGS	Colorado Geological Survey
CONO	[Colorado Springs] Council of Neighbors and Organizations
CRS	Community Rating System
CSFD	Colorado Springs Fire Department
CSP	Colorado State Patrol
CSU	Colorado Springs Utilities
CWCB	Colorado Water Conservation Board
CWPP	Community Wildfire Protection Plan
DFIRM	Digital Flood Insurance Rate Map
DMA 2000	Disaster Mitigation Act of 2000 (federal)
DOLA	Department of Local Affairs (Colorado)
EAP	Emergency Action Plan
EM	Emergency Manager
EMAP	Emergency Management Accreditation Program
EOC	Emergency Operations Center
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FSA	Farm Services Agency
FWS	Fish and Wildlife Service
GIS	Geographic Information Systems
HAZUS	Hazard loss estimation software (FEMA)
HMGP	Hazard Mitigation Grant Program
MSA	Metropolitan Statistical Area
NCDC	National Climatic Data Center
NDMC	National Drought Mitigation Center
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration

NORAD	North American Aerospace Defense Command
NWS	National Weather Service
OEM	Office of Emergency Management
PDM	Pre-Disaster Mitigation
PDMP	Pre-Disaster Mitigation Plan
PERI	Public Entity Risk Institute
PPMMRS	Pikes Peak Metropolitan Medical Response System
PPRBD	Pikes Peak Regional Building Department
PPWPP	Pikes Peak Wildfire Prevention Partners
RFC	Repetitive Flood Claim
SBA	Small Business Administration
SFHA	Special Flood Hazard Area
SHELDUS	Spatial Hazard Event and Loss Database
SMA	Subject Matter Authority
SRA	SRA International (Catastrophic Incident Plan consultant)
SRL	Severe Repetitive Loss
STAPLEE	Social, Technical, Administrative, Political, Legal, Environmental, Economic
TORRO	Tornado and Storm Research Organisation
URS	URS Corporation (consultant)
USACE	United States Army Corps of Engineers
USAFA	United States Air Force Academy
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
USPS	United States Postal Service
WSO	Weather Service Office
WUI	Wildland Urban Interface

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***Various other documents, maps, data, and other information was gathered and/or viewed at the websites listed on the Web Resources list, also included in this appendix. Sources are listed throughout the plan document.**

Web Resources *April 2010*

Agency	Website Address
STATE & NATIONAL	
American Red Cross	http://www.redcross.org/
Bureau of Reclamation	http://www.usbr.gov/
Colorado Avalanche Information Center	http://avalanche.state.co.us/index.php
Colorado DEM	http://www.dola.state.co.us/dem/index.html
Colorado Department of Local Affairs	http://www.dola.state.co.us/
Colorado Division of Water Resources	http://water.state.co.us/
Colorado Division of Wildlife	http://wildlife.state.co.us/
Colorado DOT	http://www.dot.state.co.us/
Colorado Geologic Survey	http://geosurvey.state.co.us/
Colorado Historical Society - Registered Places	http://www.coloradohistory-oahp.org/programareas/register/1503/
Colorado State Forest Service	http://csfs.colostate.edu/
Colorado State Natural Hazards Mitigation Plan 2008	http://www.dola.state.co.us/dem/mitigation/plan_2007/2008_plan.htm
Colorado State Patrol	http://csp.state.co.us/
Colorado Water Conservation Board	http://cwcb.state.co.us/
Community Rating System	http://www.fema.gov/business/nfip/crs.shtm
Drought Impact Reporter	http://droughtreporter.unl.edu/map.jsp
FEMA "How-to Guides" for Mitigation Planning	http://www.fema.gov/plan/mitplanning/resources.shtm#0
FEMA Region VIII - Contacts	http://www.fema.gov/about/contact/regionviii.shtm
FEMA Region VIII - Grants Administration	http://www.fema.gov/government/grant/administration.shtm#0
Hazards & Vulnerability Research Institute - Social Vulnerability Index	http://webra.cas.sc.edu/hvri/products/sovi.aspx
National Climatic Data Center	http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
National Flood Insurance Program	http://www.fema.gov/business/nfip/
National Interagency Coordination Center	http://www.predictiveservices.nifc.gov/fuels_fire-danger/fuels_fire-danger.htm
National Inventory of Dams	http://bsa.nfipstat.com/reports/1011.htm#COT
National Park Service	http://www.nps.gov/index.htm
National Weather Service	http://www.nws.noaa.gov/
National Wildlife Refuge System	http://www.peripresdecusa.org/mainframe.htm
PERI - Disaster Declarations	http://www.peripresdecusa.org/mainframe.htm
SHELDUS - Spatial Hazard Events and Losses Database for the US	http://webra.cas.sc.edu/hvri/products/sheldus.aspx
United States Fish & Wildlife Service	http://www.fws.gov/
United States Geological Survey	http://www.usgs.gov/
US Army Corps of Engineers	http://www.usace.army.mil/Pages/default.aspx
US Drought Monitor	http://drought.unl.edu/DM/MONITOR.html
US Forest Service	http://www.fs.fed.us/
USDA - Farm Services Agency	http://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing

Web Resources *April 2010*

Agency	Website Address
Western Regional Climate Center	http://www.wrcc.dri.edu/
LOCAL	
City of Colorado Springs	http://www.springsgov.com/
Pikes Peak Regional Building Department	http://www.pprbd.org/
Colorado Springs Utilities	http://www.csu.org/
CONO	http://www.cscono.org/
URS Corporation	http://www.urscorp.com/

HAZUS Methodology

URS followed a step-wise approach to set up and run HAZUS and calculate all associated loss estimations. The HAZUS models were completed by following three general steps. First, a HAZUS region was created that covered the area of the City of Colorado Springs. Second, a specific user-defined scenario was created, either flood- or earthquake-based, into which certain hazard model parameters were entered. Finally, the model was run based on the user-defined scenario and loss estimations calculated.

A more detailed list of steps for earthquake and flood modeling within HAZUS follows.

Earthquake Model Steps:

- Create a HAZUS "study" region that covers the geographic area of any hazard modeling. The region created for all earthquake modeling consisted of all census tracts within the corporate limits of the City of Colorado Springs.
- Within your region, create a scenario specific to each earthquake event that will be modeled.
    - A total of four earthquake scenarios were created to simulate potential earthquakes along two faults.
    - Enter user-defined earthquake parameters for each scenario. Parameters included location of epicenter, magnitude of the earthquake, and the fault's type, strike, sense of movement, and dip.
- Run the scenario.
- Calculate loss estimations for the scenario using HAZUS' built-in report function.

Flood Model Steps:

- Create a HAZUS "study" region that covers the geographic area of any hazard modeling. The region created for all flood modeling consisted of all census blocks within the corporate limits of the City of Colorado Springs.
- Develop the watershed parameters of your region.
    - Calculate the geographic extent of the watershed needed for your region.
    - Assemble a digital elevation model (DEM) covering the watershed and instruct HAZUS to process the DEM to ensure it is hydrologically correct.
    - Develop a stream network based on the processed DEM.
- Within your region, create a scenario specific to each flood event that will be modeled.
    - A total of nine flood scenarios were created to simulate four potential flood events. These include the 500-year flood, 100-year flood, 10-year flood, and 2-year flood.
    - From the stream network select all reaches to be modeled.
    - Determine known discharge values along your network of streams to be modeled and assign these values to each reach. URS researched discharge values using the USACE Fountain Creek Watershed Study, March 2006 (URS Corporation) and available FEMA flood insurance studies. If no discharge values are available for a reach, save the reach for a separate model run.
        - For reaches with no available discharge values:

- From the stream network select all reaches to be modeled.
- Select the flood recurrence interval (500-Year, 100-Year, 10-Year, or 2-Year) to model.
- Develop stream hydrology.

- Run the flood scenario to calculate a floodplain and water depth GRID.
- Calculate loss estimations for the scenario using HAZUS' built-in report function.