



Hazard Mitigation Plan

Boulder County

The Hazard Mitigation Plan identifies hazards in Boulder County and identifies values at risk and mitigation projects to reduce or eliminate impacts through community involvement.

2014 - 2019

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Section 1: Introduction

PURPOSE

In 2008 the Boulder Office of Emergency Management (OEM), together with the communities of Erie, Jamestown, Lafayette, Longmont, Louisville, Lyons, Superior, Ward, and the Boulder Valley and St. Vrain School Districts, prepared the first *Boulder County Multi-Hazard Mitigation Plan* to better protect people and property from the hazards that threaten our county. By completing the plan, our county became eligible for certain federal disaster assistance including the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program and the Pre-Disaster Mitigation program. Our county also earned credits for the National Flood Insurance Program's Community Rating System.

In 2013, as the OEM prepared to revise and update the plan as required by FEMA, we sought to review the goals our communities set for themselves in the original plan; note the accomplishments of the past five years and any remaining goals not yet achieved; reassess the hazards we face; and facilitate the setting of new hazard mitigation goals.

As with any civic effort, the process to revise and update our hazard mitigation plan works best when it is as inclusive as possible. The OEM reached out to stakeholders, partners, and residents to educate, inform, and generate unprecedented levels of participation. In addition, we launched a *virtual* planning process using social media to broaden the dialogue to include those members of our communities that in the past have been underrepresented in the planning process.

Through an inclusive revision process focused on the mitigation goals of our communities we have developed a revised plan that will help enable our communities to protect their critical facilities, reduce their liability exposure, minimize the impact and disruption caused by hazards, and reduce the costs of disaster response and recovery.

BACKGROUND AND SCOPE

Our communities within Boulder County are very familiar with the threats of fire and flood. Yet we face other hazards as well, including tornados, drought, hailstorms, and even earthquakes. Each hazard threatens in some way our economy, our property, and our lives. The good news is that we are not powerless against these threats. Through mitigation, we can reduce or even eliminate much of the damage caused by the hazards we face.

FEMA defines hazard mitigation as any sustained action taken to reduce or eliminate long term risk to human life and property from a hazard. A Congressional study found that, on average, each dollar spent on mitigation saves \$4 in future losses. Even more importantly, those savings pale in comparison to the lives we can save through mitigation.

This revised and updated plan improves upon the 2008 plan and identifies new opportunities and strategies to reduce vulnerabilities and increase resiliency and sustainability in our communities.

This plan continues to meet the requirements of the Disaster Mitigation Act of 2000 (PL 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007.

By meeting these requirements, our county will remain eligible for federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (PL 93-288). Access to these resources will be critical to enabling residents of Boulder County to mitigate against and recover from disaster.

Section 2: Community Profile

GEOGRAPHY AND CLIMATE

Our unique geography and climate help shape the hazards we face in Boulder County. We live in environments ranging from the rolling prairies in the eastern part of the county to the rugged mountains and Alpine forests in the western regions. We live at elevations climbing from 5,000 feet on the high plains to more than 12,000 feet at the Continental Divide which forms our western border.

Our climate is as varied as our topography. In winter we endure frequent snowstorms and temperatures as low as minus 30 degrees Fahrenheit. But, as those of us who live here know: snow today does not mean temperatures in the 60s tomorrow. With gusts of 120 miles per hour or more, we also experience some of the strongest winds in the continental United States. Summer typically brings us temperatures reaching the upper 90s and low levels of humidity. We receive an average of 18.17 inches of moisture each year which means that we enjoy at least some sunshine most days.

POPULATION

At the 2010 census our county had a population of 294,571. The US Census Bureau estimated that number would rise to 305,318 by 2012. Below are additional population statistics from the US Census Bureau:

Table 2.1: Boulder County Population by Jurisdiction

Jurisdiction	Population 2012 Estimate
Unincorporated Boulder County	44,837
City of Boulder	102,808
Town of Erie	19,272
Town of Jamestown	274*
City of Lafayette	25,733
City of Longmont	88,669
City of Louisville	19,074
Town of Lyons	2,033*
Town of Nederland	1,445*
Town of Superior	12,782
Town of Ward	150*

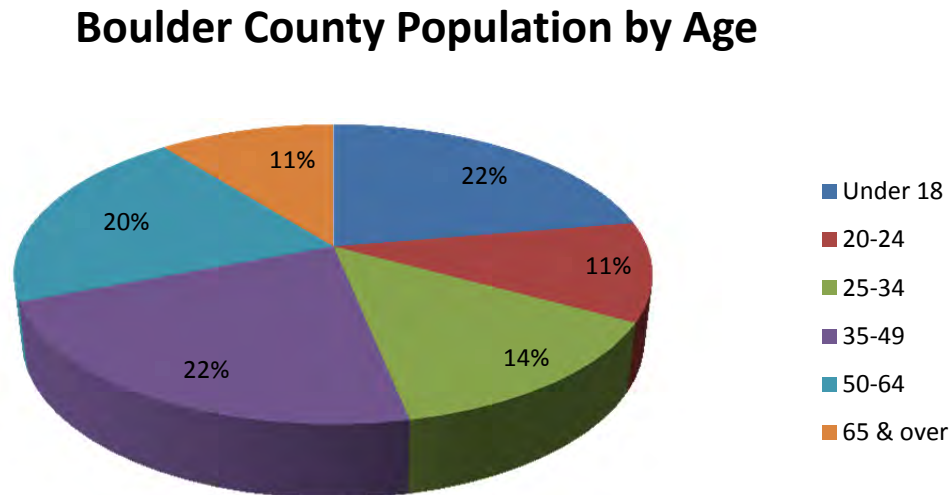
*2012 estimate not available, 2010 census data is shown.

Table 2.2: Boulder County Population by Race

Race	2010 Census	% of total county population
White	256,889	87
African American	2,532	.9
Asian	12,133	4
American Indian/Alaska Native	1,832	.6

Native Hawaiian/Pacific Islander	173	.05
Other	13,127,	4
Identified by two or more	7,881	3

Figure 3: Boulder County Population by Age



HISTORY

Native Americans were the first inhabitants of the area that would become Boulder County. The Southern Arapahoe tribe had a village here and the Utes, Cheyenne, Comanche, and Sioux also frequented the area.

Gold seekers established the first non-native settlement in 1858. Boulder became an important supply base for miners working in the mountains. At the creation of the Colorado Territory in 1861, Boulder County was one of the 17 original counties represented in the first territorial assembly. In 1873 the railroad connected Boulder to Denver as well as eastern locations to the mining camps to the west. In 1874 Boulder became the home of the University of Colorado spurring more growth.

Throughout the 20th century the University and a boom in tourism would continue to drive and shape the development of our area and attract new industries such as the National Bureau of Standards (now the National Institute of Standards and Technology) which located here in 1952.

The hazards of flood and fire have been a part of the history of our county. In 1894 a flood destroyed every bridge in Boulder Canyon and covered the flood plain in 8 feet of water. In 1913 a flood destroyed roads and cutoff the community of Jamestown for two weeks. In 1941 the St. Vrain creek flooded causing damage to homes, businesses, and farms. Notable recent wildfires include the Black Tiger fire of 1989, the Old Stage fire in 1990, the Overland fire of 2003, and the Fourmile fire of 2010.

ECONOMY

According to the US Census Bureau's 2011 American Community Survey most of Boulder County's labor force is employed in the education, health care, and social services industry. The median household income in our county is \$66,479. The per capita income is \$37,720.

Figure 4: Boulder County Employment by Industry

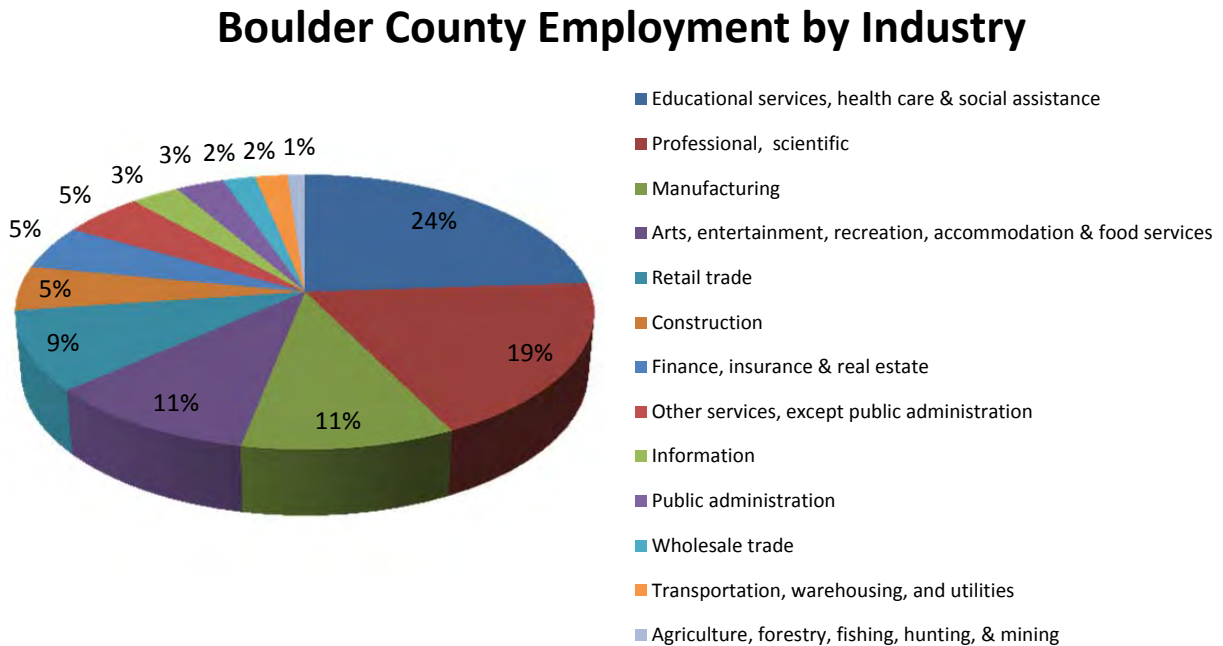
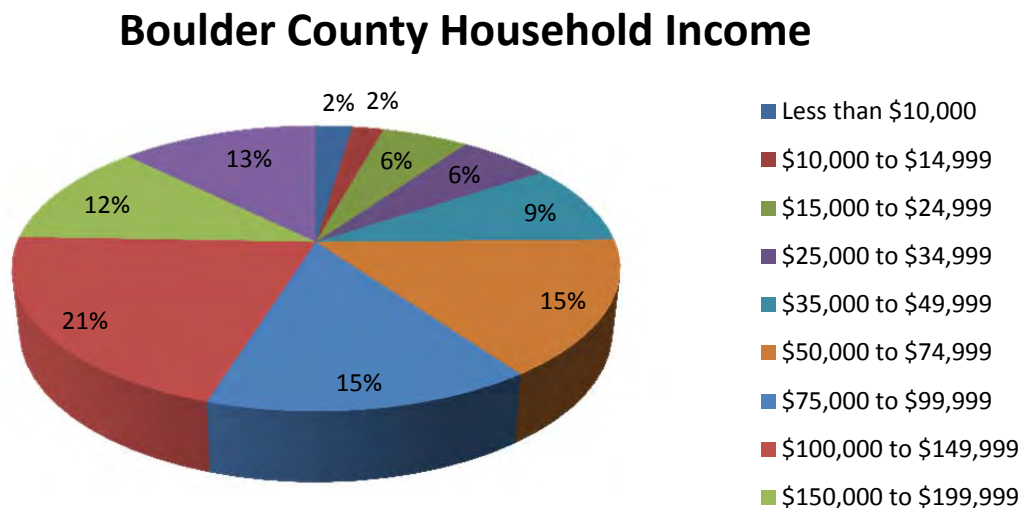


Figure 5: Boulder County Household Income



Section 3: Planning Process

Importance of this plan

Being a participant in the Natural Hazard Mitigation process qualifies organizations and communities to apply for pre disaster and post disaster mitigation grant funding for projects that decrease or remove the impacts of natural hazards. In addition, having an approved plan assists in qualifying for recovery programs, relief assistance and public assistance under a Federal Disaster Declaration.

Outcome of the Planning Process

A Hazard Mitigation Plan should bring together a community to identify hazards, assess the risks and develop pre and post disaster mitigation programs. The previous Boulder County Hazard Mitigation Plan received approval by Federal Emergency Management Agency (FEMA) in 2008. That plan was designed with a life span of 5 years. The Boulder County Natural Hazards Mitigation Planning process of 2014 is fulfilling the required update to that plan and is expected to receive approval by FEMA in 2015.

Previous work by the county to plan for hazards and options to mitigate them began in 1998 with development of the Hazards Analysis section of the Boulder Local Emergency Operations Plan. The Hazards Analysis profiled the various threats to the county, and included discussion on mitigation options/strategies, both existing and future. This plan builds off this previous effort and the efforts of the Multi-Hazard Mitigation Plan of 2008, but is aligned with the Disaster Mitigation Act (DMA) planning regulations.

FEMA requires local mitigation planning to meet the intent of regulation 44 CFR §201.6 to qualify for the above mentioned programs. In accordance with the regulation, the updating of this plan includes the following activities (1) planning process overview, (2) hazard identification and risk assessment, (3) mitigation strategy, (4) plan review, evaluation and implementation, and (5) plan adoption

Community engagement

FEMA requires community engagement in the process in order for the plan to be approved. The requirements set forth by FEMA are found in the requirements of §201.6(b) and §201.6(c). An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- 1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- 2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate

development, as well as businesses, academia and other private and nonprofit interests to be involved in the planning process;

- 3) Partners and stakeholders engagement in developing and implementing mitigation strategies is critical to successful plan adoption and operational application of mitigation projects;
- 4) Opportunities for community engagement throughout the planning process using social media outlets and tools; and
- 5) [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.

Our engagement of the community has been our strength. This process began with the kick-off meeting and continued throughout the entire process in one form or another. Community engagement initially begins with social media, press releases and scheduled meetings. Each community participating in the Natural Hazards Mitigation Plan had a responsibility to carry the message and engage their community in the process. The Boulder Office of Emergency Management created and will maintain social media sites, programs and community group facilitation as needed.

Following the September 11, 2013 flood another opportunity to engage the community arose from the devastating effects of the flood. Communities came to community meetings related to risks associated with flooding, landslides and fires. Over 20 community meetings were conducted throughout the county and recovery actions were discussed but also preparedness and risk reduction education was provided. Also creek planning committees were established for each of the drainages within Boulder County. These committees were assembled and tasked to develop mitigation projects for each creek drainage as creek restoration actions were developed.

Local Government Participation

The planning regulations and guidance of the Disaster Mitigation Act of 2000 stress that each local government seeking FEMA approval of its mitigation plan must participate in the planning effort in the following ways:

Participate in the process as part of the Hazard Mitigation Planning Committee (HMPC),
Detail areas within the planning area where the risk differs from that facing the entire area,
Identify specific projects to be eligible for funding, and
Have the governing board formally adopt the plan.

For the HMPC, “participation” meant:

Attending and participating in the HMPC meetings,

Providing available data as requested by the HMPC members,
 Reviewing and providing comments on the plan drafts,
 Advertising, coordinating, and participating in the public input process, and
 Coordinating the formal adoption of the plan by the governing boards.

Boulder County’s Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within Boulder County’s jurisdictional boundaries. Unincorporated Boulder County, the municipalities of Erie, Jamestown, Lafayette, Longmont, Louisville, Lyons, Superior, Ward, Boulder Valley & St. Vrain Valley school districts along with fire protection districts participated in the planning process and are seeking FEMA approval of this plan. The City of Boulder is covered by its own separate multi-hazard mitigation plan.

The Planning Process

The Boulder Office of Emergency Management established the planning process for the update of this plan using FEMA’s associated guidance information. This guidance is structured around a four-phase process:

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

This four-phase process also contains the more detailed 10-step planning process used for FEMA’s Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the process used for this plan meets the requirements of six major programs: FEMA’s Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, CRS, Flood Mitigation Assistance Program, Severe Repetitive Loss program, and new flood control projects authorized by the U.S. Army Corps of Engineers. The County and cities of Longmont and Louisville all participate in the CRS, and have earned planning credits from the development of this plan and by continuing in the update process.

Table 1 shows how the modified 10-step process fits into FEMA’s four-phase process.

Table 3.1. FEMA’s 4-Phase Process and the 10-Step CRS Process Used to Develop Boulder County’s Local Hazard Mitigation Plan

FEMA’s 4-Phase DMA Process	Modified 10-Step CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	

201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

Organize the Planning Effort

The Boulder Office of Emergency Management (OEM) established the framework and organization for the development of this plan update. OEM identified the key county, municipal, and other local government and initial stakeholder representatives. Letters were mailed to invite them to participate as a member of the HMPC and to attend a kickoff meeting. Table 3.2 lists the County departments and municipalities that participated on the HMPC and assisted in the development of the plan.

Table 3.2. Boulder County Hazard Mitigation Planning Committee Framework

Boulder County	Municipalities	Districts
Emergency Management	Erie	Boulder County Fire Chiefs Assoc.
Sheriff	Jamestown	Boulder Fire Chiefs Assoc.
Land Use	Lafayette	
Assessor's Office	Longmont	
Building	Louisville	
Commissioners' Office	Lyons	
Public Health	Superior	
Information Technology/GIS	Ward	
Transportation		

**The City of Boulder, which already has its own multi-hazard mitigation plan, was represented on the HMPC by the City Manager's office and Public Works Department. Boulder Office of Emergency Management also represents the City due to a 2005 joint City/County agreement.*

A list of specific HMPC representatives is included in Appendix B.

In addition to those listed in table 3.2 the following list of entities were solicited by Boulder OEM to participate on the HMPC, but declined, during the 2013 updating of this plan:

- Boulder Valley School District
- St. Vrain Valley School District

During the planning process, the HMPC communicated with a combination of face-to-face meetings, phone interviews, email correspondence, and an ftp (file transfer protocol) site. Four planning meetings with the HMPC were held during the plan's development between July and December 2013. The meeting schedule and topics are listed in the following table. The sign-in sheets and agendas for each of the meetings are on file with Boulder OEM.

Table 3.3. Schedule of HMPC Meetings & Events

HMPC Meeting	Meeting Topic	Meeting Date
1	Introduction to NHMP Planning/Kickoff Meeting Overall Plan Goals, Hazard analysis	July 16, 2013
2	Social media blitz begins	July 22- November 30, 2013
3	Vulnerability assessment, review mitigation strategies and community capabilities	August 12, 2013
4	HMP Draft Version 1 completed and sent through social media outlets to stakeholders and the community	September 9, 2013
5	Posted to Website and remained for public viewing and comment	September 25-27, 2013
6	HMP Draft Version 2 completed and sent through social media outlets to stakeholders and the community	October 20, 2013
7	HMP Re-engagement meeting at Sheriff HQ Meeting room	June, 12 2014
7	Call for mitigation projects and community profiles with stakeholders	August 28, 2014
7	HMP Draft final version completed and sent through social media outlets to stakeholders and the community	October 31, 2014
8	Plan Approval process by community	November 16, 2014
9	HMP re-engagement meeting	December 2014
10	Community Meeting Longmont	February 18, 2015
11	Community Meeting Boulder County	February 19, 2015
12	Final Social Media Announcement for community review	February 20, 2015
13	Final Draft Established on BOEM Website	February 23, 2015
14	BOCC Approval	March 4, 2015

Section 4: Risk Assessment

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.” This section describes how the County accomplished Phase 2 of FEMA’s 4-phase guidance—Assess Risks.

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

The following sections of this chapter are organized according to the methodology and four-step process described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*.

Hazard Identification identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.

Hazard Profiles discusses the threat to the planning area and describes previous occurrences of hazard events and the likelihood of future occurrences.

Vulnerability Assessment assesses the County’s total exposure to natural hazards, considering assets at risk, critical facilities, evaluates where risks vary by jurisdiction within the planning area and future development trends.

Hazard Identification

Results and Methodology

In 2008, the HMPC, used a “multi-hazard” approach. They agreed upon a list of hazards that could affect Boulder County by using existing hazards data, plans from participating jurisdictions, and input gained through planning and public meetings. Hazards data from FEMA, the Colorado Division of Emergency Management (including the State of Colorado Natural Hazards Mitigation Plan), the National Oceanic and Atmospheric Administration, the Spatial Hazard Events and Losses Database for the United States (SHELDUS), and many other sources were examined to assess the significance of these hazards to the planning area. The hazards evaluated include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

In 2013, The HMPC determined that the updated mitigation planning process would focus on Natural Hazards. They then reviewed the hazard events that have occurred since 2007, and **revised** or **retained** the following hazards, listed alphabetically to be included in the Natural Hazard Mitigation Plan.

Avalanche
Communicable / Zoonotic Disease Outbreak*
Dam and Levee Failure
Drought
Earthquake
Extreme Heat
Expansive Soils
Flood
Hailstorm
Landslide/Mud and Debris Flow/Rockfall
Lightning
Severe Winter Storm
Subsidence
Tornado
Wildfire
Windstorm

* This includes Pandemic Flu and West Nile Virus. The MHPC concluded there were not 'natural' hazards as defined as occurring from nature. They agreed to list these hazards noting where further documentation and information can be obtained.

With the exception of Communicable and Zoonotic Diseases (which were downgraded), the 2013 MHPC agreed to keep the significance levels of the various hazards the same as identified in the 2008 version of the plan. Table 1 identifies and rates the hazards included in this plan and is a composite that includes input from all the participating jurisdictions. Only the more significant hazards (high or medium) have a more detailed hazard profile and are analyzed further in the Vulnerability Assessment section (to the extent possible). Note that the significance of the hazard may vary from jurisdiction to jurisdiction (see the Jurisdictional Annexes for notes on how the significance varies for each jurisdiction). Some modifications were made to the original HMPC input based on the results of this risk assessment.

Table 4.1. Boulder County Hazards Significance Identification Worksheet

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Avalanche	Limited	Highly Likely	Limited	Low
Dam and Levee Failure	Significant	Unlikely	Catastrophic	High
Drought	Extensive	Likely	Catastrophic	High
Earthquake	Extensive	Occasional/Unlikely	Catastrophic	Medium
Expansive Soils	Significant	Highly Likely	Limited	low
Extreme Temperatures	Extensive	Likely	Critical	low

		Highly Likely/Occasional	Critical	High
Flood	Significant	Likely	Limited	Limited
Hailstorm	Extensive	Likely	Limited	Limited
Landslide/Mud and Debris Flow/Rockfall	Limited	Occasional	Limited	High
Lightning	Extensive	Likely	Limited	Medium
Pandemic Flu	Extensive	Occasional*	Critical	Medium
Severe Winter Storm	Extensive	Highly Likely	Catastrophic	High
Subsidence	Significant	Likely	Limited	Medium
Tornado	Significant	Likely	Limited	Medium
West Nile Virus	Extensive	Likely	Limited	Medium
Wildfire	Significant	Highly Likely	Critical	High
Windstorm	Extensive	Highly Likely	Critical	High

*Based on occurring anywhere in the United States

Geographic Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Probability of Future Occurrences

Highly Likely: Near 100% chance of occurrence in next year, or happens every year.

Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability

Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability

Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance

Low: minimal potential impact

Medium: moderate potential impact

High: widespread potential impact

Disaster Declaration History

One method that we used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance. The disaster assistance that is granted through either of these declarations is supplemental and sequential.

Above the state level, there are a few agencies which can authorize a disaster declaration. The federal government may issue a disaster declaration through Federal Emergency Management Agency (FEMA), the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). As a side note, FEMA also issues 'emergency declarations'. These are different from 'disaster declarations' in that they are more limited in scope and without the long-term federal recovery programs. It is the quantity and types of damage that are the determining factors between an 'emergency declaration' vs. a 'disaster declaration'.

A USDA declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. This program enables eligible farmers and ranchers in the affected county as well as

contiguous counties to apply for low interest loans. A USDA declaration will automatically follow a major disaster declaration for counties designated major disaster areas. Counties that are contiguous to the declared counties, including those that are across state lines will also qualify for benefits. As part of an agreement with the USDA, the SBA offers low interest loans for eligible businesses that suffer economic losses. These loans are referred to as Economic Injury Disaster Loans. Businesses in Counties who received a disaster declaration and those contiguous to them may apply.

Table 2 provides information on federal emergencies and disasters declared in Boulder County between 1953 and December 2012.

Table 4.2. Boulder County Disaster and Emergency Declarations, 1953-2012

Year	Declaring Jurisdiction	Disaster Type
1969	Federal/Major Disaster Declaration	Severe Storms and Flooding
1973	Federal/Major Disaster Declaration	Heavy Rains, Snowmelt, and Flooding
1989	Local	Wildfire
1990	Local	Wildfire
1994	Local	Flooding
1995	State	Flooding
1998	Local	Wildfire
2000	U.S. Department of Agriculture	Drought
2001	State	Severe Weather
2002	FEMA/Major Disaster Declaration	Wildfire
2002	U.S. Department of Agriculture	Drought
2003	FEMA/Emergency Declaration	Snow
2006	U.S. Department of Agriculture	Heat, High Winds, and Ongoing Drought (contiguous county)
2006	FEMA/Emergency Declaration	Snow
2009	FEMA/Emergency Declaration	Wildfire
2010	FEMA/Emergency Declaration	Wildfire
2011	Local	Flooding
2012	FEMA/Emergency Declaration	Wildfire
2013	FEMA Robert T. Stafford Act Presidential Disaster Declaration	Flood

Source: State of Colorado Natural Hazard Mitigation Plan, 2004; Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site. U.S. Department of Agriculture

Hazards Not Included

Other hazards were discussed by the MHPC, but ultimately not included in this plan. Thunderstorm is not identified as an individual hazard, but is recognized for its role in the flood, lightning, and windstorm hazards, and is addressed accordingly in those hazard profiles. Erosion/deposition had not been identified previously for inclusion. However, after the September 2013 rain and flood events it is important to recognize the unique and different impacts these phenomena present. Further mitigation efforts and planning will need to occur and should be included in future updates to this plan. Fog, and volcanoes were considered but removed from the list due to minor occurrences and/or impacts. Coastal erosion, coastal storm, hurricane, and tsunami were excluded because they are not experienced in Boulder County.

Hazard Profiles

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

Profile Methodology

Each hazard is profiled in a similar format that is described below.

Description

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

Geographic Extent

This subsection discusses which areas of the County are most likely to be affected by a hazard event. For clarification, 'planning area' refers to Boulder County.

Limited—Less than 10 percent of planning area

Significant—10-50 percent of planning area

Extensive—50-100 percent of planning area

Previous Occurrences

This subsection contains information on historic incidents, including impacts where known. The extent or location of the hazard within or near the Boulder County planning area is also included here. Information for the previous occurrences of these hazards was provided by the HMPC along with information from other data sources.

Probability of Future Occurrences

The frequency of past events is used in this subsection to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrences is categorized into one of the following classifications:

Highly Likely—Near 100 percent chance of occurrence in next year, or happens every year.

Likely—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.

Occasional—Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Unlikely—Less than 1 percent chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

The frequency, or chance of occurrence, was calculated where possible based on existing data. Frequency was determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. Example: Three droughts over a 30-year period equates to 10 percent chance of that hazard occurring in any given year.

Magnitude/Severity

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

Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths

Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability

Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability

Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Overall Hazard Significance

Overall vulnerability and potential impact of each hazard is summarized in this subsection, based on probability of future occurrence, magnitude of previous occurrences, and assessments of public safety risk and threat to property and infrastructure.

Avalanche

Description

Avalanche hazards occur predominantly in the mountainous regions of Colorado above 8,000 feet. The vast majority of avalanches occur during and shortly after winter storms. Avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common.

The combination of steep slopes, abundant snow, weather, snowpack, and an impetus to cause movement create an avalanching episode. According to the Colorado Avalanche Information Center (CAIC), about 90 percent of all avalanches start on slopes of 30-45 degrees; about 98 percent of all avalanches occur on slopes of 25-50 degrees. Avalanches release most often on slopes above timberline that face away from prevailing winds (leeward slopes collect snow blowing from the windward sides of ridges). Avalanches can run, however, on small slopes well below timberline, such as gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to steep slopes and prevent avalanches from starting; however, avalanches can release and travel through a moderately dense forest. An average-sized avalanche travels around 80 mph; the typical range of impact pressure from an avalanche is from 0.5 to 5.0 tons per foot.

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

This hazard generally affects a small number of people, such as snowboarders, backcountry skiers, and climbers who venture into backcountry areas during or after winter storms. Motorists along highways are also at risk of injury and death due to avalanches. Road and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches. Recognizing areas prone to avalanches is critical in determining the nature and type of development allowed in a given area.

Geographic Extent

Based on the definitions set forth previously, the geographic extent of avalanche hazard is considered **limited**, with less than 10 percent of the planning area affected. In general, avalanche hazard is highest in areas of steep slopes at high elevation where contributing conditions described above are present. This includes the alpine region of western Boulder County. More specifically, the access road to the Eldora Ski Area is an identified avalanche risk area as well as unincorporated sections of western Boulder County.

Previous Occurrences

Avalanches occur annually in western Boulder County, typically following significant snowstorms. Some of these have resulted in fatalities in Boulder County, mostly to persons recreating in the backcountry. According to the CAIC, between the winters of 1950/51 and 2010/2011, four avalanche fatalities occurred in Boulder County. Specific cases include an occurrence on December 18, 1999 on South Arapaho Peak, when two hikers were caught in an avalanche resulting in one fatality. Other notable occurrences include the closure of the Eldora Ski Area access road due to the avalanche hazard and the stranding of skiers during the March 2003 blizzard.

Probability of Future Occurrences

Probability of future avalanche occurrence is considered **highly likely**, with multiple events of varying magnitude occurring on an annual basis. Avalanches that result in property damage or fatalities occur on a less frequent scale, and the recurrence interval for avalanche fatalities for the period 1950-2014 is approximately one every 11 years.

Magnitude/Severity

Based on the definitions established for this plan, magnitude and severity of avalanche is considered **limited**, with relatively minor threat to property inventories but serious risk to the public safety.

Overall Hazard Significance

The overall hazard significance for avalanche is **low**, with relatively limited impact relative to other disasters. This assessment considers a high overall probability but a low probability of life threatening occurrences and limited magnitude of property damage and/or limited shutdown of facilities.

Communicable / Zoonotic Disease Outbreak

Description

The impact to human health that communicable disease outbreaks can have on an area can be substantial. Diseases such as HIV/AIDS and the simple head cold are communicable, or easily passed person to person through direct contact or contamination of inanimate objects or food. Hand washing and adequate personal hygiene practices can help prevent the spread of many communicable diseases.

Zoonotic diseases, such as the Swine Flu or West Nile Virus are transmitted from animal to human. Safe food and animal handling practices are the best ways to prevent the onset of these zoonotic types of disease.

Boulder County Public Health is the primary agency which handles these types of outbreaks. Further information and resources can be found at:

<http://www.bouldercounty.org/dept/publichealth/pages/cddivisionhome.aspx>

<http://www.bouldercounty.org/family/disease/pages/personalprevention.aspx>

Communicable Disease Control

303-413-7500

303-413-7517 (after hours)

Boulder County Public Health

3482 Broadway

Boulder, Co 80304

Geographic Extent

The geographic extent of Communicable and zoonotic diseases is classified as **extensive**, with 50-100 percent of the planning area affected.

Probability of Future Occurrences

Based on patterns of previous occurrence, future probability is considered **likely**, with a 10-100 percent chance of occurrence in the next year.

Magnitude/Severity

The severity of outbreaks are expected to change from year to year depending on variables such as weather patterns, the mosquito population, the bird population, and immunity in humans. Overall magnitude and severity of this hazard is classified as **limited**, with the majority of illnesses treatable and not resulting in permanent disability.

Overall Hazard Significance

Based on assessments of probability, geographic extent and magnitude/severity, the overall hazard significance of communicable and zoonotic diseases are classified as **low**, with moderate potential impact.

Dam and Levee Failure

Description

Dams are manmade structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. Dams typically are constructed of earth, rock, concrete, or mine tailings. Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of development and infrastructure located downstream.

Dam failures can result from any one or a combination of the following causes:

Prolonged periods of rainfall and flooding, which result in overtopping

Earthquake

Inadequate spillway capacity resulting in excess overtopping flows

Internal erosion caused by embankment or foundation leakage or piping or rodent activity

Improper design

Improper maintenance

Negligent operation

Failure of upstream dams on the same waterway

Overtopping is the primary cause of earthen dam failure. Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Associated water quality and health concerns could also be an issue.

Geographic Extent

In general, the geographic extent of dam and levee failure hazard is **significant**, with 10-50 percent of the planning area potentially affected by inundation and directly related impacts. More specifically, HAZUS-MH contains a database of dams based on the National Inventory of Dams (NID). This database lists 73 dams in the County and classifies dams based on the potential hazard to the downstream area resulting from failure or poor operation of the dam or facilities:

High Hazard Potential—Probable loss of life (one or more)

Significant Hazard Potential—No probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns; often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure

Low Hazard Potential—No probable loss of human life and low economic and/or environmental losses; losses are principally limited to the owner's property

Based on these classifications, there are 23 high hazard dams and 18 significant hazard dams in Boulder County. These dams are listed in Table 3 and illustrated on the map of Boulder County dams in Figure 4. The dams are listed by hazard potential, alphabetically.

Table 4.3. High and Significant Hazard Dams in Boulder County

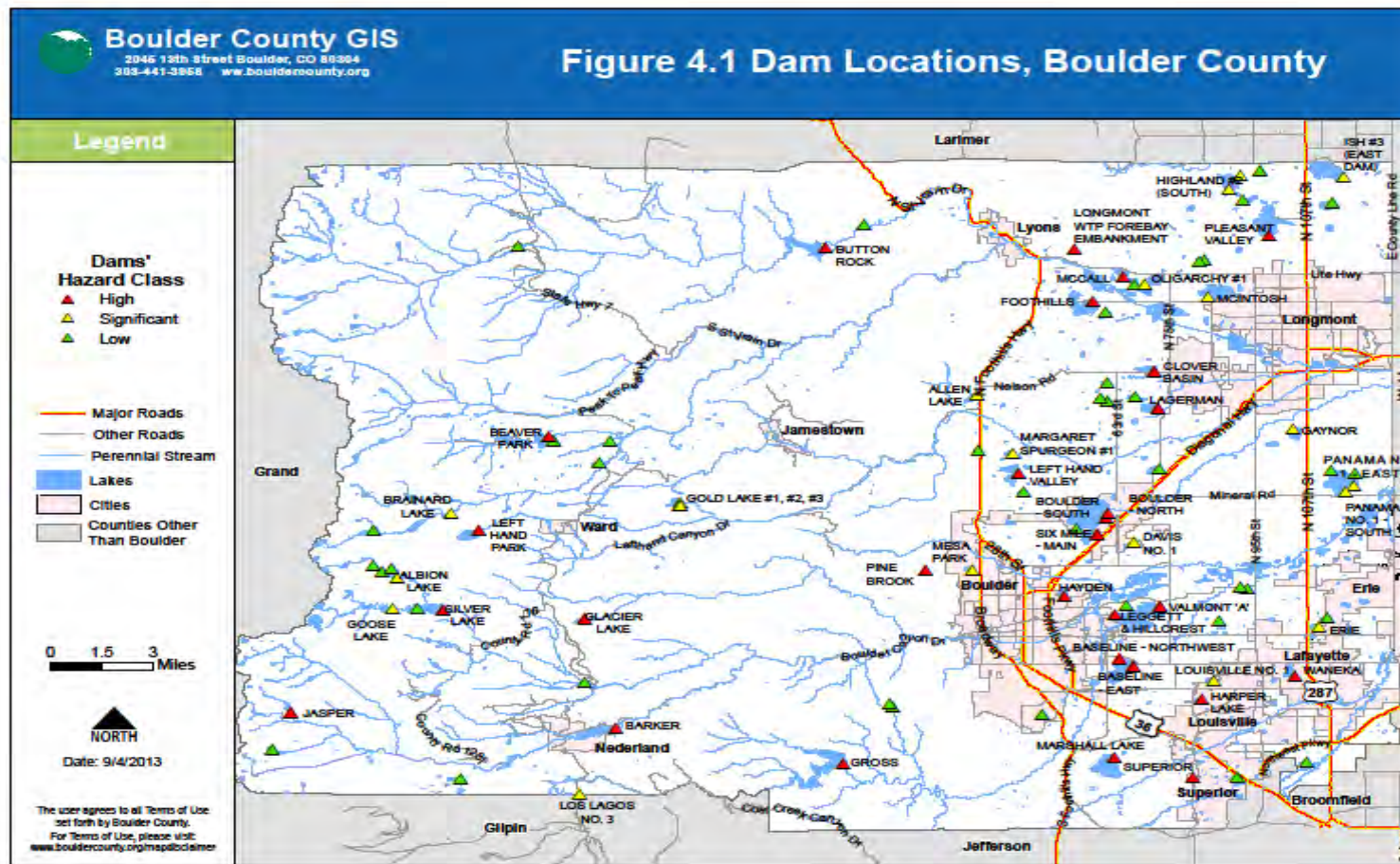
Name	River	Near City	Max Storage (acre ft)	Hazard*	Downstream Communities	Relative Down-stream Impacts
Glacier Lake	Pennsylvania Gulch	Boulder	329	H	Unincorporated	Medium
Longmont Wtp Forebay Embankment	St Vrain Creek-Os	Hygiene	129	H	Unincorporated and Longmont	Medium
Pine Brook	Two Mile Creek	Boulder	140	H	Boulder	High
Barker	Middle Boulder Creek	Boulder	12,400	H	Boulder, Unincorporated	High
Baseline	Dry Creek	Boulder	6,592	H	Unincorporated	Medium
Beaver Park	Beaver Creek	Longmont	2,731	H	Lyons, Longmont	Medium
Boulder	Dry Creek	Boulder	17,700	H	Unincorporated	Medium
Button Rock	N. Fork St. Vrain Creek	Longmont	20,400	H	Lyons, Longmont, Unincorporated	High
Clover Basin	Dry Creek-Tr	Longmont	984	H	Longmont	Low
Foothills	St. Vrain Creek	Longmont	4,767	H	Longmont, Unincorporated	Medium
Gross	South Boulder Creek	Eldorado Springs	47,500	H	Boulder, Eldorado Springs, Unincorporated	High
Harper Lake	Coal Creek-Tr	Louisville	843	H	Louisville	Low
Hayden	Boulder Creek-Os	Boulder	765	H	Boulder	Low
Jasper	Jasper Creek	Eldora	426	H	Unincorporated, El Dora	Low

Lagerman	Dry Creek-Tr	Longmont	1,832	H	Longmont	Medium
Lefthand Park	Left Hand Creek	Longmont	2,075	H	Ward, Unincorporated	Medium
Lefthand Valley	Dry Creek-Tr	Boulder	5,274	H	Boulder, Unincorporated	Medium
Leggett & Hillcrest	South Boulder Creek-Tr	Boulder	15,950	H	Boulder, Unincorporated	Medium
Marshall Lake	South Boulder Creek-Tr	Marshall	12,878	H	Louisville	Medium
Mc Call	St. Vrain Creek	Longmont	722	H	Longmont, Unincorporated	Low
Pleasant Valley	St. Vrain Creek	Longmont	4,562	H	Longmont	Medium
Silver Lake	North Boulder Creek	Boulder	4,819	H	Boulder, Unincorporated	Medium/High
Six Mile	Little Dry Creek-Tr	Boulder	2,186	H	Boulder, Unincorporated	Medium
Superior	Coal Creek-Os	Superior	500	H	Superior	Low
Valmont "A"	Boulder Creek-Tr	Boulder	15,950	H	Unincorporated	Medium
Waneka	Coal Creek-Os	Lafayette	838	H	Lafayette	Low
Albion Lake	North Boulder Creek	Boulder	700	S	Unincorporated, Boulder	Low
Allen Lake	Left Hand Creek	Longmont	784	S	Unincorporated, Boulder	Low
Brainard Lake	South St Vrain Creek		160	S	Unincorporated	Low
Davis No. 1	Dry Creek-Os	Boulder	185	S	Boulder, Unincorporated	Low
Erie	Boulder Creek-Os	Erie	360	S	Erie	Low

Gaynor	Boulder Creek	Longmont	754	S	Longmont, Unincorporated	Medium
Gold Lake	Bell Gulch	Longmont	648	S	Unincorporated	Low
Goose Lake	North Boulder Creek-Tr	Boulder	1,170	S	Unincorporated, Boulder	Medium
Highland #2	Little Thompson River-Tr	Longmont	4,613	S	Unincorporated	Medium
Ish #3 (East Dam)	Little Thompson River-Os	Milliken	9,065	S	rural Berthoud	Low
Los Lagos No. 3	Beaver Creek-Tr	Pinecliffe	60	S	Pinecliffe, Unincorporated	Low
Louisville No. 1	Bullhead Gulch-Tr	Louisville	212	S	Louisville	Low
Margaret Spurgeon #1	Dry Creek-Tr	Boulder	450	S	Boulder, Unincorporated	Low
McIntosh	St. Vrain Creek	Longmont	2,986	S	Longmont	Medium
Mesa Park	Fourmile Canyon Creek-Tr	Boulder	260	S	Boulder	Low
Oligarchy #1	St. Vrain Creek	Longmont	2,161	S	Longmont, Unincorporated	Medium
Panama No. 1	Boulder Creek-Os	Evans	7,539	S	Erie, Unincorporated	Medium

Source: National Inventory of Dams; <http://crunch.tec.army.mil/nidpublic/webpages/nid.cfm> and Division of Water Resources

Figure 4.1. Dam Locations, Boulder County



Areas that would be significantly impacted by a dam failure include the City of Boulder, unincorporated Boulder County along Boulder Creek and South Boulder Creek, and Lyons, Longmont, and unincorporated areas along St. Vrain Creek.

Levees in Boulder County are not as widespread as dams. Most of these are located in or around the City of Boulder. Some of the known flood levees are located at: the Canyon Centre between 6th and 9th Street; the Roche Chemical Plant (2075 55th St), and the City of Boulder Wastewater Treatment Plant. Another levee is located at Harrison Ave. along the Bear Canyon Creek and behind the Syntex property along Boulder Creek between Goose Creek and Foothills Pkwy. There are several levee/floodwall structures along Boulder Creek protecting properties that have been documented in a 2008 Boulder Creek floodplain restudy project.

According to a memo by the Colorado Water Conservation Board dated January 22-23, 2008, "FY 04/03 COUNTIES: All of the Boulder County levees have been identified; FEMA and the State have met with the City of Boulder and County to determine the interest in a PAL (Provisionally Accredited Levee) agreement and/or certification.

Previous Occurrences

Colorado has a history of dam failure, with at least 130 recorded occurrences since 1890 (Source: Flood Hazard Mitigation Plan for Colorado, 2004). The Lawn Lake Disaster of 1982 caused four deaths and over \$31 million in property damage when a privately owned dam failed on Forest Service Property above the Town of Estes Park in neighboring Larimer County.

According to historical data, there have been no dam failures in Boulder County. Two dams were listed as unsafe at one time but have since been repaired and the unsafe rating removed.

Probability of Future Occurrences

Due to a lack of previous occurrences within the planning area, the recurrence interval for dam failure specific to the county cannot be calculated. The possibility for future dam failure remains, but the likelihood as a result of natural hazards is estimated to be extremely low, or **unlikely**, with less than a 1 percent chance of occurrence in next 100 years.

Magnitude/Severity

According to the information in this hazard profile, a dam failure's potential impact on the county is **catastrophic**, with shutdown of facilities for more than 30 days and/or multiple deaths.

Overall Hazard Significance

The overall hazard significance for dam failure is **high**. This assessment considers a relatively low probability but potentially catastrophic magnitude and widespread impacts to infrastructure, property and public safety to the dam inundation zone.

Drought

Description

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

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

Meteorological drought is usually defined by a period of below average water supply.

Agricultural drought occurs when there is an inadequate water supply to meet the needs of the 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 stream flow, snowpack, and as lake, reservoir, and groundwater levels.

Socioeconomic drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

With its semiarid conditions, drought is a natural but unpredictable occurrence in Colorado. Due to natural variations in climate and precipitation sources, it is rare for all of Colorado to be deficient in moisture at the same time. However, single season droughts over some portion of the state are quite common. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users that have a different water supply. Individual water suppliers may use criteria, such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler, to define their water supply conditions. The drought issue is further compounded by water rights specific to a state or region. Water is a commodity possessed under a variety of legal doctrines.

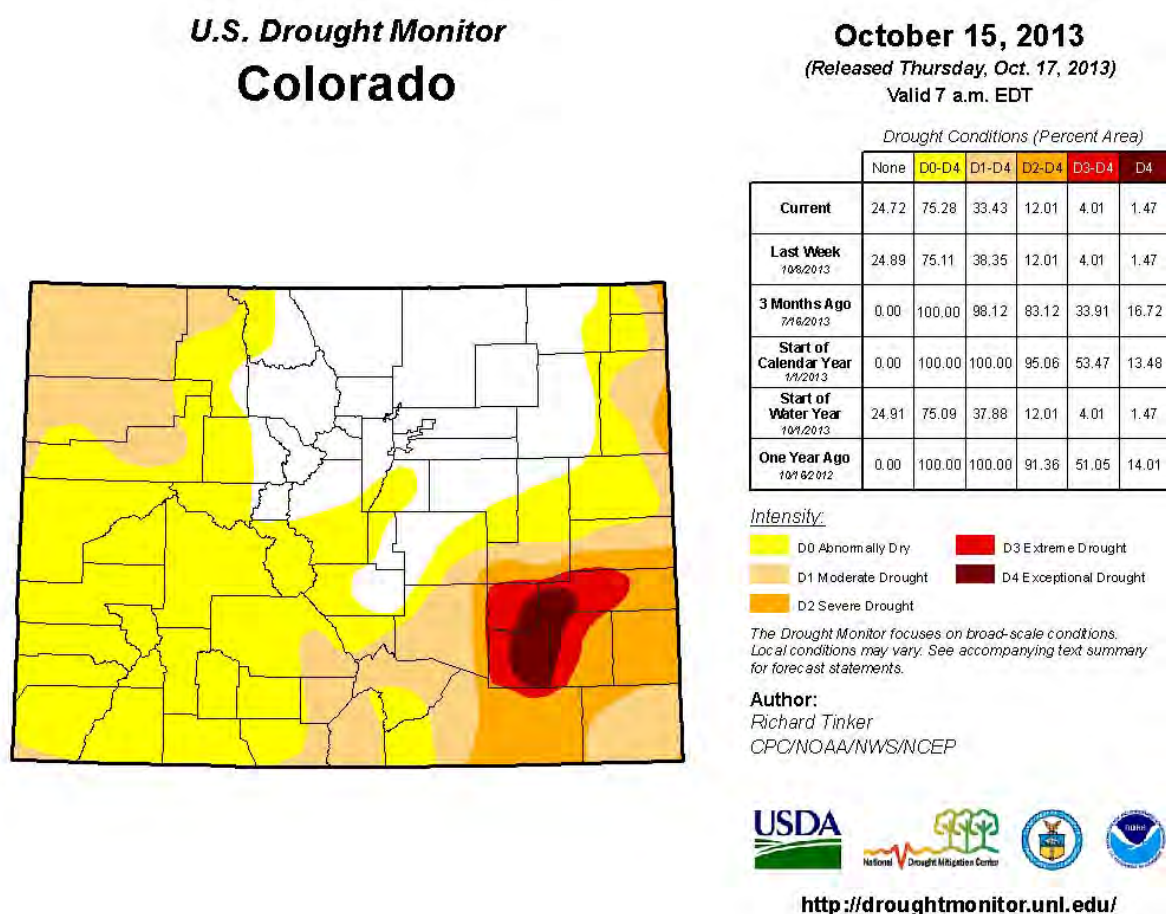
Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Colorado are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. An ongoing drought may also leave an area more prone to beetle kill and associated wildfires. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

Geographic Extent

As a regional phenomenon, drought affects all areas of the planning area with roughly the same frequency and severity. Across a broader scale that includes all of Colorado and the nation as a whole,

Figure 5 from the National Integrated Drought Information System (NIDIS) shows that Boulder County is situated in an area of north-central Colorado and has experienced the return of normal amounts of rainfall. Boulder County is at this time, no longer considered to be in a drought. However, as data from NOAA NCDC and Co Division 2 Data show, long term droughts (consisting of 3 or more years of below average rainfall) tend to occur every 10-30 years without a defined pattern.

Figure 4.2. U.S. Drought Monitor: Colorado October 2013



Based on the patterns of occurrence on a regional scale, geographic extent of drought is **extensive**, with 50-100 percent of the planning area potentially affected.

Previous Occurrences

According to the 2007 Drought and Water Supply Assessment Update, Colorado has experienced multiple severe droughts. 2002 is still considered the driest year on record for the region. In 2006 and 2007, six basins in Colorado had below 80% of average snowpack, and recovered water supplies slowly as a result. Since 2006, the County has been slowly returning to non-drought conditions due to increased precipitation levels. Table 6 details the most significant drought periods in Colorado.

Table 4.6. Significant Colorado Drought Periods of the Modern Instrumented Era

Years	Worst Years	Major State Impact Areas
1890-1894	1890 and 1894	Severe drought east of mountains
1898-1904	1902-1904	Very severe drought over southwestern Colorado
1930-1940	1931-1934, 1939	Widespread, severe, and long lasting drought in Colorado
1950-1956	1950, 1954-1956	Statewide, worse than the 1930s in the Front Range
1974-1978	1976-1977	Statewide, driest winter in recorded history for Colorado's high country and Western Slope
1980-1981	Winter 1980-1981	Mountains and West Slope; stimulated writing of the Colorado Drought Response Plan and the formation of the Water Availability Task Force
2000-2003	2001-2002	Significant multi-year statewide drought, with many areas experiencing most severe conditions in Colorado in instrumented history

Source: Drought and Water Supply Assessment, 2004,
http://cwcb.state.co.us/Conservation/Drought/Drought_Water/index_DWSA.html

The HMPC identified the following as drought events of significance in Boulder County:

1930-1937—The drought of the 1930s had the greatest impact on the agricultural industry. Poor farming techniques, low market prices, and a depressed economy compounded the problem.

1951-1957—Similar to the drought of the 1930s, the drought of the 1950s once again impacted the agricultural industry. Improvements in irrigation and farming techniques mitigated the effects.

1976-1977—This drought was characterized as a winter event, limited in duration. It was the driest winter in recorded history for much of Colorado's high country and western slope, severely impacting the ski industry.

1980-1981—This drought, beginning in the fall of 1980 and lasting until the summer of 1981, also had costly impacts to the ski industry. According to the Colorado Drought Mitigation and Response Plan, this was considered to be the last severe and widespread drought to affect Colorado.

1994—This growing season drought that impacted northeast Colorado was considered to be one of the driest years on record. Significant impacts included increased wildfires statewide, winter wheat crop losses, difficulties with livestock feeding, and declines in the state's fisheries.

1996—On July 29, 1996, the Colorado governor issued a drought disaster emergency declaration. Fifteen southwestern counties were included in a request for U.S. Department of Agriculture (USDA) assistance. Boulder County was not one of the 15. Fall and winter precipitation alleviated further drought concerns.

2000—Strong La Niña conditions created below average precipitation and above average temperatures for most months in 2000. Statewide, snowpack started out well below average but recovered to near average in March. However, an early snowmelt resulted in low stream flows, and by June, drought conditions began to affect most of the state. Conditions were most severe in the northeastern plains and the Rio Grande and San Juan/Dolores basins in the southwest. Wildfire conditions were extreme and several fires were reported statewide. Agriculture also suffered. Dryland farming and ranching was affected the most. As of October 2000, 17 Colorado counties and 29 contiguous counties were eligible for assistance as a result of a USDA secretarial disaster designation. Boulder County was eligible for aid

as a contiguous county. By fall, weather patterns returned to near normal with average precipitation and below average temperatures.

May 2002—The Colorado governor, for the first time in state history, asked the federal government to declare all of Colorado a drought disaster area. With an average temperature of 52.4 degrees, 2001 was the warmest year since 1986. The drought started in late 1999 and was compounded by scarce snowfall in 2001. 2002 was the driest year on record for the Denver region and much of the state. Total precipitation for 2002 was 7.48 inches. According to the Orodell gauge on Boulder Creek, 2002 was the worst single year on record for flow deficit.

2002-2005—Damage to trees as a result of early twenty-first century drought conditions resulted in pruning and removal costs for both parks and streets estimated at approximately \$122,660.

The Drought Impact Reporter contains information on 80 drought impacts from droughts that affected Boulder County between 1990 and 2007. The list is not comprehensive. Most of the impacts, 30, were classified as “agriculture.” Other impacts include “fire” (16), “social” (14), “water/energy” (11), “environment” (7), and “other” (2). These categories are described as follows:

Agriculture—Impacts associated with agriculture, farming, and ranching. Examples include damage to crop quality, income loss for farmers due to reduced crop yields, reduced productivity of cropland, insect infestation, plant disease, increased irrigation costs, cost of new or supplemental water resource development, reduced productivity of rangeland, forced reduction of foundation stock, closure/limitation of public lands to grazing, high cost/unavailability of water for livestock, and range fires.

Water/Energy—Impacts associated with surface or subsurface water supplies (i.e., reservoirs or aquifers), stream levels or stream flow, hydropower generation, or navigation. Examples include lower water levels in reservoirs, lakes, and ponds; reduced flow from springs; reduced streamflow; loss of wetlands; estuarine impacts; increased groundwater depletion, land subsidence, reduced recharge; water quality effects; revenue shortfalls and/or windfall profits; cost of water transport or transfer; cost of new or supplemental water resource development; and loss from impaired navigability of streams, rivers, and canals.

Environment—Impacts associated with wildlife, fisheries, forests, and other fauna. Examples include loss of biodiversity of plants or wildlife; loss of trees from urban landscapes, shelterbelts, wooded conservation areas; reduction and degradation of fish and wildlife habitat; lack of feed and drinking water; greater mortality due to increased contact with agricultural producers, as animals seek food from farms and producers are less tolerant of the intrusion; disease; increased vulnerability to predation; migration and concentration; and increased stress to endangered species.

Fire—Impacts associated with forest and range fires that occur during drought events. The relationship between fires and droughts is very complex. Not all fires are caused by droughts and serious fires can result when droughts are not taking place.

Social—Impacts associated with the public, or the recreation/tourism sector. Examples include health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations, reduced fire fighting capability, etc.), loss of human life (e.g., from heat stress, suicides), public safety from forest and range fires, increased respiratory ailments; increased disease caused by wildlife concentrations, population migrations, loss of aesthetic values; reduction or

modification of recreational activities, losses to manufacturers and sellers of recreational equipment, and losses related to curtailed activities.

Other—Drought impacts that do not easily fit into any of the above categories.

Probability of Future Occurrences

Based on patterns of previous occurrence, future probability is considered **likely**, with 10-100 percent chance of occurrence in the next year.

Magnitude/Severity

Based on assessments of potential damage to property and disruptions to commerce and day-to-day life, the magnitude and severity of drought in Boulder County is considered **catastrophic**, with the potential shutdown of facilities for 30 or more days and widespread agricultural and resource damage.

Overall Hazard Significance

The overall hazard significance for drought is **high**. This assessment is based on relatively high probability, potentially catastrophic magnitude and widespread impacts to municipal and rural water supplies, agriculture, forests and increased fire risk.

Earthquake

Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is usually expressed as a Richter magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface as felt by humans and defined in the Modified Mercalli scale (see Table 7). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4.7. Modified Mercalli Intensity (MMI) Scale

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III	Felt noticeably indoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: Multi-Hazard Identification and Risk Assessment, FEMA 1997

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Other damage-causing effects of earthquakes include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, fires, and dam failure.

Colorado is considered a region of minor earthquake activity. Geologic studies indicate there are about 90 potentially active faults in Colorado with documented movement within the last 1.6 million years.

Active faults, which represent the highest earthquake hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 15,000 years).

Geographic Extent

Geological research indicates that faults capable of producing earthquakes are prevalent in Colorado. There are about 90 potentially active faults in Colorado with documented movement within the last 1.6 million years. The map in Figure 8 indicates that potentially active faults exist in the vicinity of Boulder County that are capable of producing damaging earthquakes.

Figure 4.3. Colorado Major Fault Map



Source: State of Colorado Natural Hazard Mitigation Plan, 2007

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

- H**—Holocene (within past 15,000 years)
- LQ**—Late Quaternary (15,000-130,000 years)
- MLQ**—Middle to Late Quaternary (130,000 - 750,000 years)
- Q**—Quaternary (approximately past 2 million years)

Known faults in Boulder County include the Rock Creek (Q) and Valmont (MLQ) faults. Other faults that could affect Boulder County (e.g., other faults that were analyzed by the state for their potential impact on the County) are Frontal (LQ), Golden (Q), Mosquito (LQ), Ute Pass (MLQ), Valmont (MLQ), Walnut Creek (Q), Williams Fork (H) (see the Vulnerability Assessment section for the results of the state's analysis). The Golden, Ute Pass, and Walnut Creek faults, which could affect Boulder County, are three of the state's five potentially most damaging faults.

Based on the definitions set forth in the Hazard Profiles section, the geographic extent of earthquake hazard is considered **extensive**, with 50-100 percent of the planning area potentially impacted.

Previous Occurrences

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

The following is a summary of known earthquake activity in Colorado with a focus on the Boulder County region.

Since 1867—More than 400 earthquake tremors of magnitude 2.5 or greater have been recorded in Colorado.

November 7, 1882—On this day, the largest recorded earthquake in the state and the first to cause damage in Denver occurred. The epicenter is thought to have been located in the Front Range near Rocky Mountain National Park; the magnitude was estimated to be about 6.2 on the Richter scale. In Boulder County, the walls of the train depot cracked and plaster fell from walls at the University at Colorado. The earthquake was felt as far away as Salina, Kansas, and Salt Lake City, Utah.

1962-1967—A series of earthquakes occurred in the Denver–Boulder County area from 1962-1967. The earthquakes were felt by cities and towns within a 100-mile radius of Denver. Some people attribute this earthquake activity to deep-well injections conducted at the Rocky Mountain Arsenal starting in 1962. A few notable occurrences are detailed below.

- **1965**—Shocks on February 16, September 29, and November 20 caused intensity VI damage in the Commerce City area.
- **January 4, 1966**—A magnitude 5.0, intensity V earthquake occurred northeast of Denver.
- **April 10, 1967**—The Colorado School of Mines rated this earthquake of magnitude 5.0. The earthquake broke 118 windowpanes in buildings at the Rocky Mountain Arsenal, cracked an asphalt parking lot in the Derby area, and caused school officials in Boulder County to dismiss schools because of cracked walls. Legislators quickly moved from beneath chandeliers in the Denver Capitol Building, fearing they might fall.

- **April 27, 1967**—Minor damage was caused to walls and acoustical tile ceilings as a result of this magnitude 4.4 earthquake.
- **August 9, 1967**—Located northeast of Denver, this magnitude 5.2, intensity VI earthquake caused more than \$1 million in damage and is considered the most economically damaging earthquake in Colorado history.
- **November 27, 1967**—A magnitude 5.1, intensity VI earthquake occurred northeast of Denver.

Since **1971**, there have been 12 to 15 earthquakes located north and northeast of Denver that were large enough to be felt in Boulder County.

Probability of Future Occurrences

Seismic hazard zone maps and earthquake fault zone maps are used to identify where such hazards are more likely to occur based on analyses of faults, soils, topography, groundwater, and the potential for earthquake shaking that can trigger landslide and liquefaction. Typically, significant earthquake damage occurs when accelerations are greater than 30 percent of gravity.

The data show peak horizontal ground acceleration . Figure 4.5 depicts the shaking level that has a 10 percent chance of being exceeded over a period of 50 years. Boulder County lies in the range of 3-4 percent peak acceleration. Figure 4.6, which is more of a worst-case scenario, depicts the shaking level that has a 2 percent chance of being exceeded over a period of 50 years. In this scenario, Boulder County lies in the range of 10-12 percent peak acceleration.

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

Magnitude/Severity

Considering a worst case scenario, the potential magnitude of earthquakes is **catastrophic**, with more than 50 percent of property severely damaged, shutdown of facilities for more than 30 days and/or multiple fatalities.

Overall Hazard Significance

The overall hazard significance for earthquake is **medium**. This assessment is based on low probability but potentially catastrophic magnitude and widespread impacts to public safety, property and infrastructure.

Expansive Soils

Description

Expansive (swelling) soils or soft bedrock are those that increase in volume as they get wet and shrink as they dry. Commonly, they are known as bentonite, expansive, or montmorillinitic soils. Swelling soils contain high percentages of certain kinds of clay particles that are capable of absorbing large quantities of water and expanding up to 10 percent or more as the clay becomes wet. The force of expansion is capable of exerting pressures of 20,000 pounds per square foot or greater on foundations, slabs, and other confining structures.

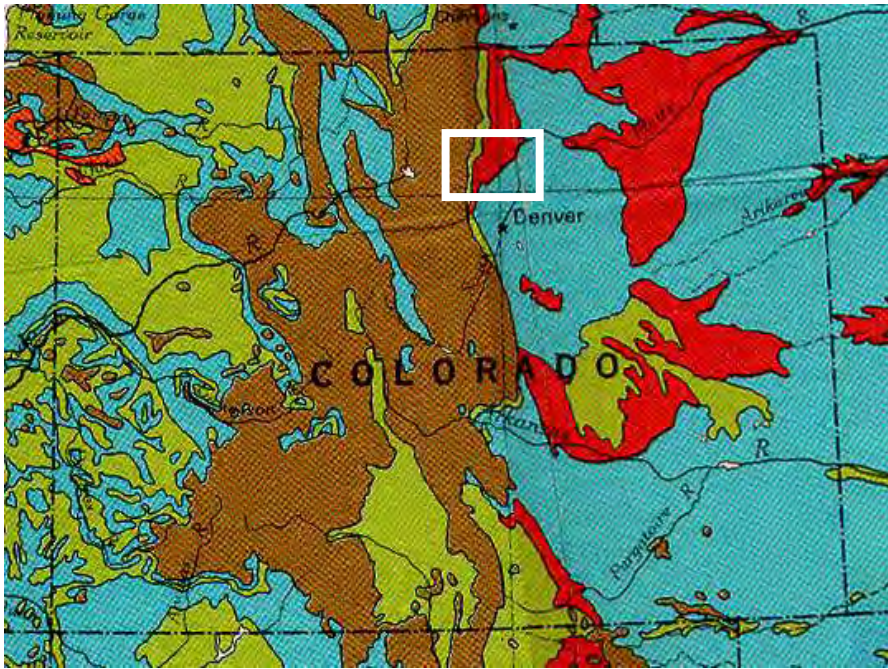
In Colorado, swelling soils tend to be at a constant moisture content in their natural state and are usually relatively dry prior to any construction disturbance. Exposure to water sources during or after development generally results in swelling. Colorado, with its arid or semiarid areas and seasonal changes in soil moisture, experiences a much higher frequency of swelling problems than eastern states that have higher rainfall and more constant soil moisture. Rocks that contain swelling clay are generally softer and less resistant to weathering and erosion than other rocks; therefore, expansive soil events occur more often along the sides of mountain valleys and on the plains than in the mountains.

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

Geographic Extent

Figure 9 on the following page shows a large area of Boulder County consisting of soils with high swelling potential. The approximate location of Boulder County is indicated by the white box. Expansive soils tend to be most concentrated in the eastern sections of the planning area whereas the western sections of the county have significantly less occurrence of soils susceptible to swelling. Overall geographic extent is **significant**, with 10-50 percent of the planning area affected by concentrations of expansive soils.

Figure 4.4. Soil Map of Colorado



MAP LEGEND

	Unit contains abundant clay having high swelling potential
	Part of unit (generally less than 50%) consists of clay having high swelling potential
	Unit contains abundant clay having slight to moderate swelling potential
	Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential
	Unit contains little or no swelling clay
	Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost states only)

Source: U.S. Geological Survey publication "Swelling Clays Map of The Conterminous United States";1989;
http://arcvoid.com/surevoid_web/soil_maps/ks.html

Note: White rectangle represents approximate location of Boulder County

Previous Occurrences

Damage of varying degrees of severity occurs on an ongoing and seasonal basis. The frequency of damage from expansive soils can be associated with the cycles of drought and heavy rainfall and also reflect changes in moisture content based on typical seasonal patterns. Published data summarizing damages specific to Boulder County is not available, but it is acknowledged that a certain degree of damage to property and infrastructure occurs annually.

Probability of Future Occurrences

Based on patterns of previous occurrences, probability of future occurrence is **highly likely**, with multiple occurrences on an annual basis.

Magnitude/Severity

The magnitude of expansive soils is considered **limited**, based on the definitions established previously, with 10-25 percent of property severely damaged. This assessment considers that damage of severe magnitude does not occur in a single shrink-swell cycle, but rather over much longer time periods to the effect that building foundations, underground pipes and streets and highways must be replaced over shorter timeframes.

Overall Hazard Significance

The overall hazard significance for expansive soils is **medium**. This assessment is based on high probability but relatively low potential public safety impacts and moderate impacts to property and infrastructure.

Extreme Temperatures

Description

Extreme Heat

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornadoes, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

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

The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days.

Extreme Cold

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

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

Geographic Extent

In general, extreme temperatures affect broad regions that include all parts of Boulder County, and therefore the geographic extent is **extensive**, with 50-100 percent of the planning area affected.

However, extreme heat tends to affect areas of lowest elevation in the eastern portion of the county with the greatest severity and areas of higher elevation experience extreme low temperatures with greater frequency and severity.

Previous Occurrences

For the eastern sections of Boulder County over the period 1948-2007, monthly average maximum temperatures in the summer months (June, July, and August) were in the 80s. The highest recorded temperature in eastern Boulder County was 104°F on June 23, 1954, and July 11, 1954. On average, 32 days exceeded 90°F each year.

Temperature patterns for the western sections of Boulder County were monitored at Gross Reservoir over the period 1978-2007. The monthly average maximum temperatures in the summer months (June, July, and August) ranged from the low 70s to the low 80s. The highest temperature recorded at this station in western Boulder County was 93°F on July 23, 2005. On average, four days exceeded 90°F each year.

Probability of Future Occurrences

The probability of future extreme cold conditions and/or extreme heat is considered **likely**, with a 10-100 percent chance of occurrence in any given year.

Magnitude/Severity

The magnitude and severity of extreme temperatures is classified as **critical**, with 25-50 percent of property or infrastructure severely damaged, and/or shutdown of facilities for two weeks or more, and/or injuries that result in fatality or permanent disability

Overall Hazard Significance

The overall hazard significance for extreme temperatures is **medium**. This assessment is based on high probability, moderate potential public safety impacts and moderate impacts to property and infrastructure.

Flood

Description

Floods can be among the most frequent and costly natural disaster in terms of human hardship and economic loss and can be caused by a number of different weather events. Floods can cause injuries and deaths and substantial damage to structures, landscapes, and utilities. Certain health hazards are also common to flood events. Standing water and wet materials in structures can become a breeding ground for microorganisms such as bacteria, mold, and viruses. This can cause disease, trigger allergic reactions, and damage materials long after the flood. Direct impacts such as drowning can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be critical to reduce life and safety impacts.

Risk of flooding in Boulder County is increased as a result of the burn scars such as that left by the Fourmile Canyon Fire in September of 2010. Heavy rainfall, especially in the form of cloudbursts, is alone capable of causing flooding, even more so if it occurs over the burn areas where vegetation has largely been lost. Floods caused by rainstorms can peak within a few minutes or hours of the rainfall, leaving little time for evacuation.

Communities in Boulder County are susceptible to various types of flood events as described below.

Riverine or Overbank Flooding

This type of flooding is defined as when a watercourse exceeds its “bank-full” capacity and is usually the most common type of flood event. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with soils or drainage systems that are already saturated or overloaded from previous rain events. The duration of riverine floods may vary from a few hours to several days.

Factors that directly affect the amount of flood runoff include precipitation amount, intensity, and spatial and temporal distribution; the amount of soil moisture; seasonal variation in vegetation; snow depth; and the water resistance of the surface due to urbanization. The largest watersheds extend as far west as the continental divide and snowmelt in these watersheds dominates streamflow in late spring and early summer. Heavy rainfall on top of the snow pack can increase the rate of snowmelt and the extra runoff can produce significant flooding downstream. Other factors, such as debris blocking a waterway or channel, can further aggravate a flood event. In portions of Boulder County, development has altered the natural environment, changing and interrupting some of the natural drainage-ways. As a result, drainage systems can become overloaded more frequently.

The most serious overbank flooding occurs during flash floods that result from intense rainstorms or following a dam failure. The term “flash flood” describes localized floods of great peak flow and magnitude and short duration. In contrast to riverine flooding, this type of flood usually results from a heavy rainfall on a relatively small drainage area. Flash floods by definition occur very quickly and may occur with little or no warning. Flash flood risk can be greatly increased when drainages are cleared of foliage that normally absorbs and slows the rate of runoff.

Irrigation Ditch/Canal Flooding

The eastern portion of Boulder County has more than 100 irrigation ditches and canals used to convey water collected in the mountain reservoirs to downstream users. Ditches convey irrigation water along hillsides, following contours and, as a result, cut across the natural drainage pattern of stormwater runoff flowing down hillsides. Although efforts are made to separate stormwater runoff and irrigation water, excessive runoff can flow into an irrigation ditch causing overbank flooding or a collapse of the ditch itself. Similar to flash floods, there is often little warning for these types of events.

Urban or Street Flood Events

These events occur due to the conversion of land from fields to roads and parking lots, which cause the land to lose its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. Except at underpasses, street flooding and yard ponding usually do not exceed more than a foot or two and are often viewed more as a nuisance than a major hazard. However, during periods of urban flooding, high velocity flows can occur in streets, even in areas with only shallow flooding.

Until recently, the Lefthand Creek floodplain was devoted entirely to agriculture. Now, because of expanding population and industrialization, urban development has begun at both ends and in the middle of the study reach.

Floodplains

The area adjacent to a channel is the floodplain. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a 1% chance in any given year of being equaled or exceeded. The 100-year flood is the federal minimum standard to which communities regulate their floodplains through the National Flood Insurance Program.

The potential for flooding can change and increase as a result of land use changes and changes to land surface that change the floodplain. A change in environment can create localized flooding problems in and out of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity. Development in narrow mountain canyons presents a unique flooding problem as the floodplain and floodway occupy essentially the entire canyon floor. Historically the mountain canyons were developed extensively with infrastructure, private residences, and small amounts of commercial and industrial property. Much of this development occurred along stream banks within the canyon floodways presenting a flooding hazard to those properties as well as debris hazards for downstream stream reaches. Since floodplain management regulations were incorporated into the Boulder County Land Use Code, new development is no longer allowed within the mountain canyon floodways which causes rise in BFE and cannot get a CLOMR.

The county's flood mitigation efforts have been in place for many years. Codes and ordinances have been adopted prohibiting or controlling building in floodplains. Mitigation efforts, such as channelization

and detention ponds, have been built and some high-risk buildings located in floodplains have been removed. A flood warning system, made up of stream and rain gauges, is in drainages. These gauges are monitored by the Boulder Office of Emergency Management during high-risk rain events and automatically transmit data to a computer in the Boulder Communications Center that sounds an alarm when significant amounts of rainfall occur and when rising stream levels are detected. A flood warning plan has been developed for Boulder County, which is exercised and updated annually. The southeast portion of the county is served by the Urban Drainage and Flood Control District. The following communities participate in the National Flood Insurance Program (NFIP): unincorporated Boulder County, City of Boulder, Lafayette, Longmont, Louisville, Jamestown, Lyons, Nederland and Superior. Boulder County and the cities of Longmont and Louisville participate in the NFIP's Community Rating System, which provides flood insurance discounts to communities that implement floodplain management activities above and beyond the minimum standards.

Levees

For flood protection from Boulder Creek, a levee was constructed around the 75th Street Wastewater Treatment Plant. The levee was found to provide protection from the 1-percent annual chance flood, and it meets all of the requirements set forth in Section 65.10 of the NFIP regulations. If this levee were breached, damage to the wastewater treatment plant could result in release of untreated wastewater to the creek.

The University of Colorado South Campus Levee provides protection from the 1-percent annual-chance flood event. If this levee were breached, no development beyond CU Boulder's tennis complex would suffer damage.

Flood protection measures along Coal Creek in the Town of Erie include channelization and the construction of levees from approximately 5,700 feet downstream to approximately 600 feet upstream of the UPRR. As a result of this project, the base flood and floodway are contained within the channel from approximately 2,750 feet downstream to the UPRR. The flooding associated with the Coal Creek West Line Overflow through the town has been eliminated. If this levee were to breach to the west, the flooding threat would be to the historic Briggs Street neighborhood in Erie. This area is outside of Boulder County, but included here because it is within the municipal boundaries of Erie, one of the participating communities on the HMPC.

Other Flood Issues

All communities in Boulder County, both incorporated and unincorporated are experiencing population growth and resulting development. While a small portion of new development is occurring in the sparsely developed mountainous area of western Boulder County, the expected development in this area is unlikely to significantly affect the county's watersheds' hydrology and hydraulics related to runoff in Boulder County streams. The bulk of new development in the county is expected to occur in the high

plains areas to the east of the Front Range foothills. Increased development will likely include all typical types of land uses including residential, commercial, and industrial. Where development occurs outside of established floodplains, it will contribute to increased stormwater runoff flowing to streams due to inevitable increases in impervious surfaces from new roads and buildings. The result will be an increase in potential for urban flooding as a result of a reduced capacity of the land to absorb precipitation.

Projections and land use plans suggest that an increase in population within previously developed portions of regulatory floodplains is expected in Boulder County. It is unlikely that floodwater conveyance would be significantly affected through these previously developed areas as building footprints and other urban infrastructure will remain relatively unchanged. The Boulder County Land Use Code also allows structures to be developed in the flood fringe portion of the base floodplain. However, the Boulder County Comprehensive plan requires that development be concentrated within the municipalities. While new structures in previously undeveloped portions of the floodplain will likely represent a small fraction of development within the floodplain, any new structures will present small localized impediments to floodwaters. This type of flood fringe development is likely to occur in rural residential and agricultural areas in unincorporated portions of the high plains east of the Front Range foothills.

Regardless of shifts in development patterns, Boulder County anticipates that flood risks will change due to climate change as the phenomenon persists. Stratus Consulting produced the Boulder County Climate Change Report in 2012 and provided a general outlook on the expected effects of climate change on local natural systems and processes including those related to runoff and flooding. As a result of climate change, a seasonal shift in precipitation patterns and timing is expected with an increase in precipitation expected to fall between December through March and a decrease in precipitation in spring months of April and May. Stratus Consulting addressed extreme precipitation events and flooding as well. Their report cites studies that suggest an increase in late winter and spring heavy precipitation events with two-year recurrence intervals and a decrease in events of similar recurrence intervals in the summer months. However another study cited in the report suggests that precipitation events in the Front Range area with recurrence intervals of three years and greater will likely increase in intensity. The report summarizes the expected change in precipitation patterns by stating that research indicates a general decrease in event frequency but an increase in event intensity. It may be expected then, that more intense events will have the potential to affect areas beyond the acknowledged and regulated floodplains.

References:

Stratus Consulting. 2012. Boulder County Climate Change Preparedness Plan, Prepared for Boulder County Commissioner's Sustainability Office. Boulder, CO

Boulder County Land Use Code

Boulder County 2005 Comprehensive Plan- Currently involved in 2015 update process

Geographic Extent

Boulder County has multiple creeks, tributaries, and associated floodplains that comprise the geographic extent of flooding throughout the planning area. Based on the definitions set forth previously, this extent is considered **significant**, constituting roughly 10-50 percent of the planning area.

Much of the floodplain is used for agriculture, thus the most common flooding impact is crop losses and damage to irrigation equipment and rural roads and bridges. There are also undefined, localized zones of flow velocity hazard throughout the monitored section of Lefthand Creek. Generally, these zones are in the channel and near bridges.

All stream reaches east of the foothills, except for those on Fourmile Canyon Creek, are located within urbanized areas with occasional open-space and park areas. The terrain of these sub-basins consists of mild slopes with topsoil in the B and C hydrologic soils group with some D soils. Vegetation for most of the stream reaches is characteristic of urban areas. Fourmile Canyon Creek is located in sparsely developed agricultural areas. Vegetation along Fourmile Canyon Creek and the downstream reaches of Bear, Skunk, Goose, and Wonderland Creeks consists of natural grasses and weeds.

Previous Occurrences

The flood season in Boulder County is typically April 1 through September 30, but floods can happen at any time. The most dangerous flooding in Boulder County tends to occur from mid-July through early September due to heavy precipitation from thunderstorms and monsoonal rains. Creeks with mountainous, upstream watersheds are subject to flash floods as are urban streams and drainage ways. A flood event would most likely result from a heavy rainstorm that stalls over any of the creek basins with increased risk if it stalled over the Fourmile burn area. It could rain for as little as 20-30 minutes in the foothills before the water starts overflowing stream banks.

The state of Colorado's worst flash flood occurred on July 31, 1976, in the Big Thompson Canyon west of Loveland, claiming over 400 houses and 144 lives. Another catastrophic event occurred at Ft. Collins in 1997, when 14.5 inches of rain led to flooding that claimed five lives and caused \$200 million in damages.

The state of Colorado's second worst flooding event occurred on September 11, 2013. Three days of rain occurred prior to September 11, 2013 saturating the ground. Rainfall was continuous on the 11th and by 10 p.m. widespread flooding occurred and the rain would not stop until late on September 14th, 2013. The rainfall during this period totaled 17 inches to the northern and southern areas of the county and 8 inches of rain over the plains and foothills.. Over 750 landslides occurred and caused dams which added to the devastating nature of the flooding. Over 1700 homes were totally destroyed, 10 deaths and damages exceeded 2.5 Billion. Boulder County had over 10,000 residences affected by flooding, over 800 homes destroyed, 150 miles of road wash out and 4 deaths.

Major flooding events recorded within Boulder County include the following detailed by area/drainage:

Boulder Creek

May 23, 1876—A general storm over the Boulder Creek basin created flooding on the plains of Boulder County up to one and a half miles wide.

May 29 to June 2, 1894—This flood, caused by a downpour, washed away much of the city of Boulder's downtown district. Mountain rainfall, combined with snowmelt runoff, produced the greatest flood known in Boulder County and inundated the valley. Bridges, buildings, roads, and railroads were washed away. Every bridge in Boulder Canyon was swept away destroying the highway and railroads as far up the canyon as Fourmile Canyon Creek. Buildings were destroyed at Crisman, Sunset, and Copper creeks. The town was isolated from other Colorado communities for five days. Only one person was killed. Records indicate that the floodplain was inundated by water over an area as much as one-mile wide for several days. Floodwater covered the entire area between Canyon Boulevard (previously Water Street) and University Hill to depths as great as eight feet. The rainfall amount has been estimated at 5.5 inches. Computations made 18 years later produced estimates of the peak discharge ranging from 9,000 cubic feet per second (cfs) to 13,600 cfs. This was considered a slow-rising flood and designated as a 100-year event. Agricultural damage included loss of livestock, crops, pastures, fences, and roads, and the deposition of sand and silt on floodplain lands. Although damage was extensive, a dollar amount was not estimated at that time.

July 8, 1906—Heavy rains over Sunshine Canyon (an estimated 2.8 inches Saturday night through Sunday) led to extensive flooding. The water spread out at the point where the dry gulch comes into Pearl Street, rushed down through gardens at the corner of Third Street, through Pearl, and down into Walnut and Railroad streets. Vast quantities of sand and debris were deposited on lawns and gardens. Water stood two-feet deep on the platform at the Colorado and Southern passenger depot and the yards were so flooded that the tracks were not visible. By building a temporary wall at Third Street, people were able to direct the water in its natural channel across Pearl and down into Boulder Creek. The flooding did considerable damage to the Silver Lake ditch, which broke and contributed a considerable quantity of water to the flood and affected the west part of town.

June 1-2, 1914—The peak discharge on the creek was estimated at 5,000 cfs. Numerous bridges were washed out between Colburn Mill and Boulder Falls. A portion of the main line for city of Boulder water system was destroyed.

June 2-7, 1921—Rainfall totaled 3.36 inches in Boulder County. A peak discharge of 2,500 cfs was recorded on June 6, 1921.

September 4, 1938—Maximum discharge of 4,410 cfs occurred near the mouth of Boulder Creek. Numerous bridges were destroyed.

May 6-8, 1969—This flood was the result of a combination of snowmelt in the mountains and four days of continuous rainfall. Total precipitation for the storm amounted to 7.6 inches in Boulder County and 9.3 inches at the hydroelectric plant in Boulder Canyon. Bear Canyon Creek, Skunk Creek, and Twomile Canyon Creek overflowed their banks. Damage from this storm was estimated at \$325,000. Schools were closed. The gauging records show that floods the size of the May 1969 flood occur on an average of about once every five years on Boulder Creek.

July 13, 2011—The Fourmile Canyon Fire on Sept. 6, 2010, heavily damaged the canyon area. The wildfire destroyed 169 homes and severely burnt over 6000 acres of land. On July 13, 2011, a thunderstorm released over $\frac{3}{4}$ inch of rain in an hour resulting in a flow of over 1800 cfs. This caused debris and mudslides in the Fourmile Canyon area and low impact flooding along Boulder Creek.

September 11, 2013- Three days of rain saturated the ground prior to September 11, 2013 causing high surface runoff and landslides/ debris flows throughout Boulder County. The rainfall totals during this event delivered 17 inches causing wide spread flooding. Boulder Creek drainage had 8 inches of rain over this period and sustained approximately 5500 cfs causing localized flooding along the creek and student housing on CU Campus. The City of Boulder Water Treatment Center was impacted causing sewer backups and flood waters overtopped many roads to the East.

South Boulder Creek

September 2, 1938—In the mountains west of Eldorado Springs, six inches of rain fell resulting in flooding that destroyed many buildings in the Eldorado Springs community and exceeded previous flood records dating back to 1895. Eldorado Springs recorded 4.4 inches of rainfall. This resulted in a peak discharge of 7,390 cfs, which is the highest recorded flood on South Boulder Creek. The picture at right shows the destroyed dancehall at the Eldorado Springs Resort.

September 11, 2013- Three days of rain saturated the ground prior to September 11, 2013 causing high surface runoff and landslides/ debris flows throughout Boulder County. The rainfall totals during this event delivered 17 inches causing wide spread flooding. South Boulder Creek drainage had 17 inches of rain over this period and sustained approximately cfs causing localized flooding along in Eldorado Springs, washed out county roads and added to CFS total after the confluence with Boulder Creek.

Boulder County also identifies the following flood events at South Boulder Creek with peak discharges in excess of 1,000 cfs:

- **June 3, 1895**—1,130 cfs
- **May 9, 1900**—1,100 cfs
- **June 20, 1909**—1,340 cfs
- **May 24, 1914**—1,240 cfs
- **June 6, 1921**—1,440 cfs
- **September 2, 1938**—7,390 cfs
- **June 21, 1947**—1,290 cfs
- **June 6, 1949**—1,430 cfs
- **June 18, 1951**—2,370 cfs
- **June 4, 1952**—1,080 cfs
- **May 7, 1969**—1,690 cfs
- **September 11, 2013** – 2,100cfs

Fourmile Canyon Creek

Fourmile Canyon Creek experiences occasional flooding with notable events occurring in 1916, 1941, and 1951. Railroad bridges were washed out in 1916 and 1941. Localized flooding along the lower reaches of Fourmile Canyon Creek occurs frequently. Damage and losses have generally been low

because the area is somewhat undeveloped. However, this threat has increased significantly since the Fourmile Canyon Fire in September 2010.

July 23, 1909—Heavy rains caused two injuries and two deaths as flash flooding occurred in Twomile Canyon and Fourmile Canyon creeks. Damage to bridges and pipelines also resulted. Boulder Creek was not highly affected.

July 30, 1916—Heavy rain (one to three inches) centered over Fourmile Canyon caused a brief but strong flash flood causing flooding of farms and damage to roads, railroad, bridges, and irrigation ditches. Though the Folsom Street (then 26th Street) bridge crossing was covered with three feet of water, it was not damaged by the flood. The flood water was from 10 to 12 feet deep on the Terry ranch. Damage was estimated at several thousand dollars (1916).

July 2-7, 1921—Flooding in Coal Creek and Fourmile canyons occurred destroying numerous structures, injuring and killing livestock, and damaging bridges. The maximum recorded rainfall was 5.3 inches and the greatest recorded rainfall intensity was 4.3 inches in six hours at Longmont. This flood was produced by a combination of rainfall and snowmelt.

July 13, 2011—1.18 inches of rain in a short period of time fell over the area, resulting in over 1200 cfs in Fourmile Canyon Creek. Water and debris flows damaged homes, but no injuries or deaths were reported.

Fourmile Creek

July 13, 2011—3/4" of rain in a short period of time fell over the area, resulting in over 700 cfs in Fourmile Creek. Water and debris flows damaged homes, but no injuries or deaths were reported.

September 11, 2013- Three days of rain saturated the ground prior to September 11, 2013 causing high surface runoff and landslides/ debris flows throughout Boulder County. The rainfall totals during this event delivered 17 inches causing wide spread flooding. In Four mile Creek 8inches of rain over this period and sustained approximately 1000 cfs causing localized flooding along the creek washing out roads and flooding homes.

Goose Creek

Significant flooding occurred in September 1951 and July 1954. The 1954 event damaged an addition to the community hospital that was under construction.

September 11, 2013- Three days of rain saturated the ground prior to September 11, 2013 causing high surface runoff and landslides/ debris flows throughout Boulder County. The rainfall totals during this event delivered 17 inches causing wide spread flooding. Goose Creek flooded homes and overtopped roads in the area.

Lefthand Creek

Significant flooding on Lefthand Creek occurred in 1864, 1876, 1894, 1896, 1918, 1921, 1938, 1949, 1951, 1963, 1969, 1973 and 2013. Details of some of these events follow:

June 1894—Heavy rains combined with high spring runoff caused extensive flooding throughout Boulder County. Damage was extensive along Lefthand Creek, and bridges and roads were washed out. Buildings in Ward, Rowena, Glendale, and all the towns along James Creek (a tributary of Lefthand Creek) sustained heavy damage or were swept away. Damage to nearby mines was also extensive. Trees were uprooted, roads and railroads were destroyed, and 10 families lost homes. James Creek grew to a width of 250 feet at some locations. 8.5 inches of rain from May 30 through June 1 was reported in Ward.

August 1913—Jamestown suffered extensive flood damage in August 1913. Flooding damaged or destroyed most of the houses along the creek. All wagon and footbridges were destroyed, and Jamestown was isolated for two weeks when the access road washed out.

June 2-6, 1921—The maximum recorded rainfall was 5.3 inches and the greatest recorded rainfall intensity was 4.3 inches in six hours at Longmont. The storm lasted for five days. This flood was produced by a combination of rainfall and snowmelt. Although this storm caused overbank flooding, neither discharges nor damage were recorded.

September 3, 1938—During this storm, showers were generally over the Lefthand Creek basin accompanied by isolated cloud bursts along the foothills and the lower elevations. A maximum peak discharge of 812 cfs was recorded at U.S. Highway 287 near Longmont.

June 4, 1949—Heavy and prolonged rainfall, accompanied by runoff from snowmelt, caused overbank flooding on Lefthand Creek during May and early June. The high flow caused minor damage to irrigation headworks, bridges, and farmlands. The peak discharge was 1,140 cfs.

August 3, 1951—A heavy rainstorm occurred over the Front Range and foothills east of the Continental Divide from Boulder County to near Fort Collins, a distance of approximately 50 miles. One of the storm centers was on Lefthand Creek near the town of Niwot. At this storm center, total precipitation was unofficially reported to have been over six inches. Overbank flows occurred along most of the length of Lefthand Creek. Bridges, roads, crops, and irrigation structures were damaged.

May 7-8, 1969—Three days of heavy snow and rain along with spring runoff caused a flood that damaged houses and businesses in Jamestown and caused major erosion damage to roads and bridges along James Creek. Peak discharge measurement on James Creek was 1,970 cfs. Precipitation totals of approximately eight inches were recorded in the James Creek Basin. The primary damage was done to the South Pratt Parkway bridge, which was ultimately destroyed by the floodwater.

September 11, 2013- Three days of rain saturated the ground prior to September 11, 2013 causing high surface runoff and landslides/ debris flows throughout Boulder County. The rainfall totals during this event delivered 17 inches causing wide spread flooding. In Lefthand Creek over 10 inches of rain fell over this period and sustained approximately 8500 cfs causing flooding to homes, damage to the Lefthand Water District infrastructure and washing out roads. 1 person died in their home when a debris flow caused by the ground saturation and rainfall.

St. Vrain Creek

St. Vrain Creek flood history dates back to 1844. Flooding also occurred in 1864, 1876, 1894, 1914, 1919, 1921, 1938, 1941, 1949, 1951, 1957, 1969, 1973, 1976 and 2013. Over the course of 100 years, floods along the St. Vrain Creek have destroyed farmland, roads, and bridges.

May 1876— The flood was severe and much valley farmland was flooded.

May 31, 1894—All of the lower parts of Lyons were washed away and 20 houses were destroyed or ruined. The St. Vrain Valley looked like a lake three miles wide. Peak discharge was estimated at 9,800 cfs, which made it greater than a 50-year event.

August 2, 1919—Bridges on the North St. Vrain for about a ten mile stretch were destroyed. Longmont and Lyons water mains up the canyon were torn out in many places. People living on the lowlands along the banks of the St. Vrain were flooded out. Peak discharge was estimated at 9,400 cfs.

June 2, 1921—North and South St. Vrain creeks carried large volumes of water. Damage was done to bridges, sheds, and barns. The peak discharge at Lyons of 2,020 cfs was not indicative of conditions at Longmont because of heavy rain downstream from Lyons. Longmont recorded 5.9 inches. No estimate of the discharge at Longmont is available.

September 1-4, 1938—Precipitation for the three-day period totaled 4.5 inches at Longmont. The peak discharge at Lyons was only 1,650 cfs, while it was estimated to be 8,360 cfs near the mouth of the St. Vrain Creek. Highways were underwater, some bridges were washed out, and many residents near the creek were forced from their homes.

June 2, 1941—Overbank flooding as a result of four inches of rain in the Longmont area caused damage or destruction of homes, businesses, bridges, roads, water lines, crops, livestock, and irrigation structures. The peak discharge was 10,500 cfs.

June 4, 1949—All bridges between Longmont and Lyons were impassable when the St. Vrain peaked at 6,700 cfs. A total of 16 bridges were damaged. Two were completely destroyed. Irrigation headworks were extensively damaged. In Longmont, 10 homes and 5 businesses were flooded.

August 3, 1951—Lyons received 6.3 inches of rain from a cloudburst, causing flooding from Lyons to the mouth of St. Vrain Creek. The peak discharge was 3,700 cfs at Lyons and 6,200 cfs at a point seven miles east of Longmont. Railroad and highway bridges near Longmont were severely damaged. The flood lasted for less than 12 hours. Severe damage resulted to Colorado Highway 7 along South St. Vrain Creek. In the rural areas downstream from Lyons, many grain shocks were washed from the fields.

May 8-9 1957—Three to five inches of rain fell over the entire St. Vrain basin, peaking at 3,060 cfs in Lyons. Irrigation works and bridges between Lyons and Longmont were damaged or destroyed.

May 4-8, 1969— Three days of heavy snow and rain along with spring snow melt / runoff caused flooding which damaged two bridges in Lyons, 14 bridges outside of town, numerous town streets and other property. Highways 7 and 36 were closed. Roads and bridges along streams were damaged, stream banks were eroded, and farmlands were flooded. The peak discharge at Lyons was 2,900 cfs on May 7 and 10,300 cfs on May 8.

June 15-21, 1969—Roads and bridges along the stream were extensively damaged, stream banks were eroded, and farmlands were flooded.

August 10, 1994—approximately three inches of rain fell in a period of 30 minutes in Lyons. An urban flash flood resulted when the drainage system was unable to manage the large amounts of water. Damage to streets alone was \$65,000. There were no reported deaths or injuries. The property damage was estimated at \$213,000 and other damage to streets was \$65,000. Highways 7 and 36 were closed as a result..

September 11, 2013- Three days of rain saturated the ground prior to September 11, 2013 causing high surface runoff and landslides/ debris flows throughout Boulder County. The rainfall totals during this event delivered 17 inches causing wide spread flooding. In the Saint Vrain Basin 17 inches of rain fell

over this period and sustained approximately 25,000 cfs causing flooding to the Town of Lyons, Hygiene, and Longmont. 1 person died while evacuating their home.

Twomile Canyon Creek

The worst flood on Twomile Canyon Creek occurred in September 1933. Other flooding events occurred in 1909 (see Fourmile event above), 1941, 1942, 1949, and 1965.

September 11, 2013- Three days of rain saturated the ground prior to September 11, 2013 causing high surface runoff and landslides/ debris flows throughout Boulder County. The rainfall totals during this event delivered 17 inches causing wide spread flooding. In Twomile Canyon Creek approximately 6-8 inches of rain fell over this period. Homes were damaged by flooding and landslides in the area, roads washed out and two people died when their car was washed away in the flood waters.

Miscellaneous

May 30, 1896—Flooding occurred in Marshall and Boulder County caused by locally heavy thunderstorms. Estimated rainfall was 4.6 inches. Large hail was also present during the storm.

August 19, 1896—A cloudburst over Magnolia tore up the road beyond Salina and made Fourmile Canyon Creek impassable. Considerable damage was done to property in Salina. According to reports, “Boulder has not had such a dashing rain storm as that of yesterday afternoon for a long time.” The lightning burned out the telephone of the *Daily Camera* office. The rise of the creek in the south part of town was so rapid and of such threatening proportions as to cause great anxiety for two or three hours to the people living in that section.

July 31, 1929—Nearly five inches of rain fell causing flooding in Fourmile Creek, Boulder Creek, and South Boulder Creek. Water ran in streams down Boulder County streets and across University Hill lawns and sidewalks. Damage was estimated at \$4,000 to roads, bridges, and culverts. Principal damage was on 10th Street from Chatauqua to University Avenue and 12th Street from University Avenue to Arapahoe. A large section of the Armstrong Bridge in Gregory Canyon was washed out and 150 feet of Baseline Road in front of the Chatauqua golf course was covered with rock and gravel. A cement sidewalk across Gregory ditch on Marine Street was washed out.

June 22, 1941—Heavy rains caused flooding in areas of Fourmile Canyon Creek, St. Vrain Creek, Twomile Canyon Creek, and Boulder Creek. Flash floods swept a Longmont man to his death. The storm dropped one inch of rain and more to the north and west of the County. Roads, gullies, and some structures were damaged in several areas. Damage estimates were in the thousands of dollars (1941). The storm was centered over Sugarloaf Mountain and primarily affected Fourmile and St. Vrain canyons. Numerous roads were partially or completely destroyed.

August 20, 1982—An estimated 2.1 inches fell in Rollinsville, a considerable amount for such high elevation at 9,370 feet above mean sea level.

May of 1995—Boulder County received record rainfall (9.4 inches) that combined with above average snowfall in the mountains and caused flooding throughout Boulder County. St. Vrain Creek in Lyons and Longmont as well as lesser streams throughout the county overflowed. Boulder Creek ran at its highest level of the year, but did not overtop its banks within the city limits. The biggest threat was a related mudslide at the base of Flagstaff Road that threatened six homes.

July 30, 1997—Heavy rain and hail triggered a flash flood that sent a wall of water through the window of the financial aid office at the University of Colorado (CU). A pipe draining rainwater at the Coors Event Center broke and damaged ceiling tiles, carpets, and dressing rooms. In all, 10 CU buildings received water damage estimated at a total of \$100,000.

August 4, 1999—Flooding and flash flooding problems developed over portions of the Front Range urban corridor as slow moving thunderstorms dumped from 2 to 3.5 inches of rain in approximately three hours. Widespread flooding was reported in Boulder County as was damage to the University Memorial Center at CU.

Probability of Future Occurrences

It only takes three inches of rain over a few hours to trigger a 100-year flood. Those conditions are worsened by the lack of rain absorption caused by the Fourmile Canyon Fire in September 2010. Because of its large population and location at the mouth of the narrow Boulder Canyon, the city of Boulder has the greatest potential for loss of life from a flash flood of any community in Colorado. An estimated 6,000 people live and work in the floodplain of Boulder Creek, which runs through the heart of the City. Since the County has a history of flooding, the potential exists for more flooding in the future.

The probability of future flooding occurrence ranges from **highly likely** to **occasional**, considering the entirety of the planning area.

Magnitude/Severity

The magnitude and severity of floods is classified as **critical**, with significant threat to public safety, 25-50 percent of property severely damaged and the potential shutdown of facilities for at least two weeks.

Overall Hazard Significance

Based on assessments of probability, risk to public safety and property, the overall hazard significance for flooding is **high**.

Hailstorm

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 occur throughout the spring, summer, and fall in the County, but are more frequent in late spring and early summer. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 mph.

Severe hailstorms can be quite destructive. In the United States, hail causes more than \$1 billion in damage to property and crops each year. In 2005, hail and wind damage made up 45 percent of homeowners insurance losses. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury to humans, and occasionally has been fatal.

Hail is a major cause of property damage in the plains just east of the Rockies. The past 30 years have brought one catastrophic hailstorm after another to the Front Range. One of these large storms occurred on July 11, 1990, when Denver took a direct hit by hail during a severe thunderstorm. Damage totals close to \$600 million were reported—the greatest property losses from hail ever reported from one storm up to that time and one of the most expensive natural disasters to affect Colorado.

Geographic Extent

Hailstorms can occur across broad regions that includes all sections of Boulder County. The geographic extent is **extensive**, with 50-100 percent of the planning area exposed to hailstorm impacts.

Previous Occurrences

A study conducted in 1994 by the state climatologist looked at recorded hail statistics from 1973 to 1985 and from 1986 to 1993. The data used for this study is limited as systematic observations of hail are taken only at a small number of weather stations. Therefore, this study relied on point weather station data from a small number of sites in and near Colorado along with statewide data on severe hailstorms obtained from the national publication, *Storm Data*. Further, since hail occurs only briefly and tends to be very localized, many storms go undetected by the official weather stations. Regardless, by analyzing the existing data, this study uncovered the following statistics regarding hailstorms in Colorado:

The hail season in Colorado begins in March and ends in October.

There has been an average of more than 130 reported severe hailstorms each year since 1986.

Overall, June has the highest frequency of days with hail with slightly more than 10 on average.

Hail in Colorado is primarily an afternoon or evening phenomenon; 90 percent of all severe hailstorms reported between 1986 and 1993 occurred between 1:00 and 9:00 p.m.

Hail usually only falls for a few minutes. Hail that continues for more than 15 minutes is unusual.

A study of 60 Fort Collins hail events showed the median duration to be six minutes.

The vast majority of hailstones that fall in Colorado are ½ inch in diameter or smaller.

The most common size range for damaging hail in Colorado is 1 to 1.5 inches in diameter.

Six percent of the reported severe hailstorms had maximum hailstone diameters of 2.5 inches or greater.

The maximum hailstone size reported in this study was 4.5 inches.

Hail frequency can be very variable. For example, there were only 25 severe hail days in 1988 compared with 51 in 1993.

Severe hail is not a statewide problem. It is limited to eastern Colorado beginning in the eastern foothills and extending across the eastern plains.

Data from the National Climatic Data Center and SHELDUS identified 109 hail events in Boulder County between January 1, 1955, and November 30, 2014, with hailstones at least one inch in diameter 65 times. Of these, the following hail events resulted in reported damage to people or property:

August 2, 1986—Hailstones of 1.75 inches caused six injuries.

July 1989—A storm caused hail damage in the city of Boulder and Lafayette.

July 1990—A severe hailstorm caused massive hail damage, localized flooding, and rockslides on Highway 119 at the mouth of Boulder Canyon.

September 17, 1993—Hailstones of 0.75 inches (in Lafayette) caused \$5,000 in property damage.

July 12, 1996—Hailstones of 1.25 inches (in Broomfield) caused \$1 million in property damage. Large hail, strong winds, and heavy rain caused substantial damage to property in portions of Boulder County and northern Jefferson County. Damage estimates in the Broomfield area alone were approximately \$1 million.

06/28/2013- Severe thunderstorms developed over the Front Range Foothill of Boulder, Larimer and Gilpin Counties; then spread east into the Urban Corridor and adjacent plains. Large hail, ranging from quarter to golfball size, was reported. In addition, damaging thunderstorm winds snapped large branches and knocked down power lines.

Probability of Future Occurrences

Probability of future occurrence is classified as **likely**, with 10-100 percent chance of occurrence within a range of severity in the next year.

Magnitude/Severity

Based on the definitions established for this plan, magnitude and severity is classified as **limited**, with 10-25 percent of property, agricultural crops and natural resources potentially damaged and a limited history of public safety impacts.

Overall Hazard Significance

Based on assessments of probability, risk to public safety and property, the overall hazard significance for hailstorms is **high/medium**.

Landslide/Mud and Debris Flow/Rockfall

Description

Landslide

A landslide is a general term for a variety of mass-movement processes that generate a downslope movement of soil, rock, and vegetation under gravitational influence. Some of the natural causes of ground instability are stream and lakeshore erosion, heavy rainfall, and poor quality natural materials. In addition, many human activities tend to make the earth materials less stable and, thus, increase the chance of ground failure. Human activities contribute to soil instability through grading of steep slopes or overloading them with artificial fill, by extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation. Landslides typically have a slower onset and can be predicted to some extent by monitoring soil moisture levels and ground cracking or slumping in areas of previous landslide activity.

Mud and Debris Flow

According to the Colorado Geological Survey, a mudslide is a mass of water and fine-grained earth materials that flows down a stream, ravine, canyon, arroyo or gulch. If more than half of the solids in the mass are larger than sand grains—rocks, stones, boulders—the event is called a debris flow. A debris fan is a conical landform produced by successive mud and debris flow deposits, and the likely spot for a future event.

The mud and debris flow problem can be exacerbated by wildfires that remove vegetation that serves to stabilize soil from erosion. Heavy rains on the denuded landscape can lead to rapid development of destructive mudflows.

Rockfall

A rockfall is the falling of a detached mass of rock from a cliff or down a very steep slope. Weathering and decomposition of geological materials produce conditions favorable to rockfalls. Rockfalls are caused by the loss of support from underneath through erosion or triggered by ice wedging, root growth, or ground shaking. Changes to an area or slope such as cutting and filling activities can also increase the risk of a rockfall. Rocks in a rockfall can be of any dimension, from the size of baseballs to houses. Rockfall occurs most frequently in mountains or other steep areas during the early spring when there is abundant moisture and repeated freezing and thawing. Rockfalls are a serious geological hazard that can threaten human life, impact transportation corridors and communication systems and result in other property damage. Due to the Fourmile Canyon Fire in 2010, there is an increased risk of debris flows in Fourmile Canyon.

Spring is typically the landslide/rockfall season in Colorado as snow melts and saturates soils and temperatures enter into freeze/thaw cycles. Rockfall and landslides are influenced by seasonal patterns, precipitation and temperature patterns. Earthquakes could trigger rockfalls and landslides too.

Geographic Extent

This hazard is most prevalent in the foothills of western Boulder County, particularly in the canyons that dissect the region, most of which have County roads or State highways running through them, and some residential development. Developed areas with rockfall potential include Eldorado Springs and sections of Boulder Canyon. Areas of recent wildfire burns are susceptible to debris flow. These areas include the Black Tiger Fire burn area in Boulder Canyon and the Overland Fire area near Jamestown. Rock fall and debris flows can impact foothills transportation corridors from Lyons to Allenspark, Boulder to Nederland, and Ward to Jamestown, and along the Peak to Peak highway (Highways 7, 72, 36, 119, and 72)

The Colorado Landslide Hazard Mitigation Plan, developed in 1988 and updated in 2002, identified 49 areas in Colorado where landslides could have the “most serious or immediate potential impact on communities, transportation corridors, lifelines, or the economy.” One area in Boulder County was identified from the Black Tiger wildfire in 1989. The Fourmile Canyon Fire burn area from September 2010 is also a high-risk area for debris flows, rockfalls and erosion. The wildfire leaves the potential for debris flows, rockfalls and extreme erosion in the area around the fire. Minor landslides will likely continue in susceptible areas as a result of post-fire conditions or when heavy precipitation occurs.

The underlying geology in the steeper slopes of western Boulder County is generally granitic bedrock, and thus resistant to landslide issues, but can be prone to rockfall. Based on assessments of the potential area affected by landslide, debris flow and rockfall, geographic extent is considered **limited**, with less than 10 percent of the planning area prone to occurrence. It should be noted however that when this hazard causes road closures, the overall area affected indirectly can be much larger than the slide area itself.

Previous Occurrences

On September 11, 2013 1 person died due to debris flow /landslide caused by ground saturation and rainfall over the burn scar above Jamestown. During the 2013 flood over 800 landslides occurred in Boulder County alone. Damage to structures, infrastructure and highways occurred as a result of landslides. In addition landslides during inundation events also exacerbates flash flooding due to damming of canyons holding back large creeks creating devastating hydraulic forces. Development in areas vulnerable to landslides increases the potential for destructive landslides and rockfalls. Most historical landslides that have occurred in Boulder County were a secondary impact associated with wildfires and/or heavy rains. For instance, the highway in Boulder Canyon below Sugarloaf Mountain was closed at least six times during the months following the Black Tiger fire in July 1989 after mud, boulders, and other debris slid down onto the highway. One home was destroyed, and two others were damaged. A mudslide also occurred at the base of Flagstaff Road during a period of heavy rains in May and June of 1995. Approximately six homes were threatened by the slide.

According to an HMPC team member from the Town of Jamestown, multiple landslides occurred as a result of unstable soil in a burn area from the Overland fire. The landslides occurred between the burn area and James Creek on June 23, 2004, July 23, 2004, July 29, 2004, July 25, 2005 and July 20, 2006. County Road 94 was closed due to the mudslides. The damage to culverts and channels could exceed \$150,000 before the soil stabilizes. Mudslides are expected to continue over the next 5 to 10 years. Property damage mitigation costs have been \$80,000 to \$100,000 to date.

According to a newspaper article from the Daily Camera in the mid-1990's (exact date unknown) a boulder the size of a Volkswagen impacted a home in the unincorporated community of Eldorado Springs. No one was injured in the incident.

In July 1990 a severe hailstorm caused massive hail damage, localized flooding and rockslides on Highway 119 at the mouth of Boulder Canyon. Most recently, on July 20, 2006 heavy rain in the Overland burn area caused minor flash flooding in Jamestown. The roads behind the Jamestown Fire Hall were washed out when a culvert became blocked with debris. A rockslide was also reported in the town.

Probability of Future Occurrences

Based on patterns of previous occurrences, future probability of landslide/debris flow/rockfall occurrence is classified as **occasional**, with a 1-10 percent chance of occurrence in the next year.

Magnitude/Severity

Based on the definitions established for this plan, magnitude and severity is considered **limited**, with 10-25 percent of property severely damaged and/or shutdown of facilities for more than one week.

Overall Hazard Significance

Based on assessments of probability, public safety risk and the potential for property and/or infrastructure damage, the overall hazard significance for landslide/debris flow/rockfall is **high/medium**.

Lightning

Description

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds.

Lightning is one of the more dangerous weather hazards in the United States and in Colorado. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of \$6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

Intra-cloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel, similar to a cloud-to-ground flash, can be visible for many miles.

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

The ratio of cloud-to-ground and intra-cloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year.

Boulder County implemented the use of lightning software to monitor lightning occurrences in the county. All Fire Departments and Districts were trained in July 2012 on the use of the software and provided a username and password to access it. This enables Fire Departments and Districts to monitor

cloud-to-ground strike within their jurisdictions and respond as they see appropriate, given the fire conditions.

Geographic Extent

Lightning can potentially impact any portion of Boulder County, though isolated peaks and other points of high elevation relative to their surroundings are at increased probability of direct impact. It should also be noted that power outages caused by lightning strikes can affect a much broader region beyond the location of the lightning strike or storm. Therefore, geographic extent is classified as **extensive**, with 50-100 percent of the planning area at risk from lightning and its affects.

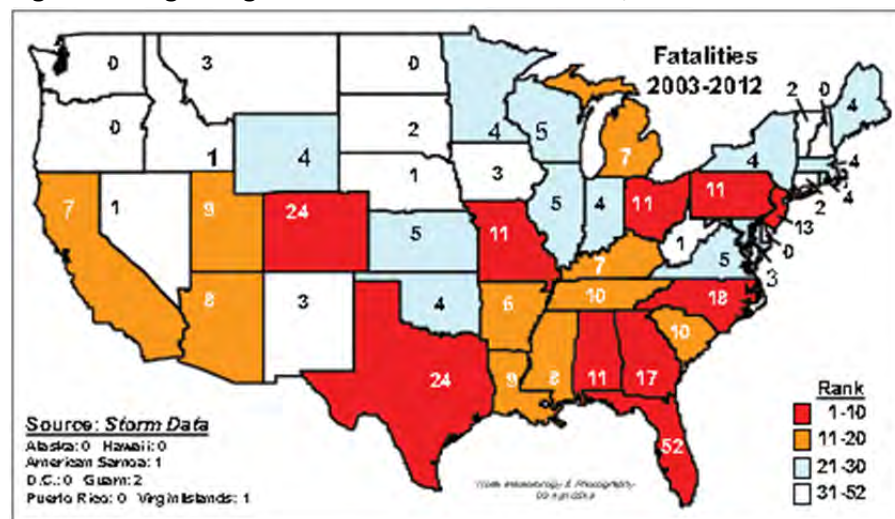
Previous Occurrences

Data from the National Lightning Detection Network ranks Colorado 31st in the nation (excluding Alaska and Hawaii) with respect to the number of cloud-to-ground lightning flashes with an average number of 517,217 flashes per year (based on data collected between 1996 and 2005). Boulder County has an average of 3,500 flashes per year.

According to the National Weather Service, an average of 62 people are killed each year by lightning in the United States. In 2012, only 1 person was injured by lightning in Colorado. In an average year, 3 people in the Centennial State are killed by lightning and 13 are injured (1980-2012 data). The true injury number is likely higher than this, because many people do not seek help, and not all lightning-related injuries are reported as such by doctors.

U.S. lightning statistics compiled by the National Oceanic and Atmospheric Administration between 1959 and 1994 indicate that most lightning incidents occur during the summer months of June, July, and August and during the afternoon hours from between 2 and 6 p.m. Figure 10 shows state-by-state lightning deaths between 2003 and 2012. Colorado ranks second (ties with Texas) for the number of deaths at 24. Only Florida, with 52 deaths, had more.

Figure 4.5. Lightning Fatalities in the United States, 2003 - 2012



Source: National Weather Service, http://www.lightningsafety.noaa.gov/stats/03-12_deaths_by_state.pdf

Table 4.8 contains information from the National Weather Service on lightning casualties in Boulder County:

Table 4.8. Lightning Casualties in Boulder County, 1980-2010

Date	Time	Killed	Injured
June 27, 1980	2:12 p.m.	0	4
June 3, 1981	12:00 p.m.	1	2
August 22, 1981	Morning	0	2
August 5, 1983	Evening	0	1
July 2, 1987	5:34 p.m.	0	4
August 7, 1987	7:30 p.m.	0	1
June 25, 1988	3:30 p.m.	1	1
August 19, 1989	12:35 p.m.	1	1
June 13, 1991	2:00 p.m.	0	1
August 30, 1992	11:30 a.m.	0	1
June 27, 1995	3:30 p.m.	0	1
June 5, 1997	2:00 p.m.	0	1
June 7, 1997	12:00 p.m.	0	1
June 19, 1997	2:04 p.m.	0	1
July 10, 2000	3:40 p.m.	0	3
July 12, 2000	2:00 p.m.	1	0
July 24, 2000	3:00 p.m.	0	2
August 3, 2009	12:00 p.m.	0	1
August 3, 2010	3:00 p.m.	0	1

Totals	4	29

Source: National Weather Service, http://www.crh.noaa.gov/pub/?n=/ltg/county_stats_1.php

According to the State of Colorado Natural Hazards Mitigation Plan, a study determined that 1 out of 52 lightning flashes results in an insurance claim.

Data from the National Climatic Data Center and SHELDUS identified 40+ lightning events in Boulder County between January 1, 1993, and November 30, 2014 (note: since this data is from a different source, it does not track exactly with the incidents reported in Table 4.6). The 17 lightning events that resulted in death/injury and/or property damage are detailed below:

May 15, 1993, 4:00 p.m.—Lightning resulted in property damage of \$5,000.

May 27, 1993, 2:55 p.m.—Lightning resulted in property damage of \$5,000 (Lyons).

May 31, 1994, 6:00 p.m.—Lightning resulted in property damage of \$1,000 (Louisville).

July 27, 1994, 4:00 p.m.—Lightning resulted in property damage of \$5 million. (The damage occurred when lightning struck a furniture store in Boulder, igniting a fire which caused major damage to the building and contents).

June 2, 1995, 11:10 a.m.—Lightning resulted in property damage of \$5,000 (Nederland).

June 2, 1995, 5:30 p.m.—Lightning resulted in property damage of \$20,000.

June 27, 1995, 3:30 p.m.—Lightning resulted in one injury (Longmont).

September 14, 1996, 5:00 p.m.—Lightning resulted in property damage of \$7,000 (West Longmont).

June 5, 1997, 2:00 p.m.—Lightning resulted in one injury (Nederland).

June 7, 1997, 12:00 p.m.—Lightning resulted in one injury (Ward).

June 19, 1997, 2:04 p.m.—Lightning resulted in one injury (Broomfield).

July 10, 2000, 3:40 p.m.—Lightning resulted in three injuries.

July 12, 2000, 2:00 p.m.—Lightning resulted in one death (Allenspark). (A climber was struck and killed by lightning as he and a companion were ascending a sheer rock face near the summit of Longs Peak).

July 24, 2000, 3:00 p.m.—Lightning resulted in two injuries (Longmont).

June 19, 2002, 5:30 p.m.—Lightning resulted in property damage of \$25,000.

August 5, 2002, 2:00 p.m.—Lightning resulted in one injury.

June 22, 2006- Lightning kills a motorcyclist on highway 36

May 21, 2007, 2:00 p.m.—Lightning resulted property damage of \$5,000. The 15,000-gallon fuel tank, which stored diesel gas for farm equipment, was also struck. The explosion shot the tank an estimated 150 feet in the air and it landed approximately 400 feet from its original location.

June 26, 2012 – Flagstaff Fire – Lightning caused a fire that threatened residences and the City of Boulder. Total cost to fight the blaze was 1.9 million.

Also, according to an HMPC team member from Lyons, lightning caused a three hour electric power outage on August 10, 1994 in Lyons. This was in conjunction with heavy rain and high winds.

Probability of Future Occurrences

Based on patterns of previous occurrences, the future probability for damaging lightning strikes is classified as **likely**, with a 10-100 percent chance of occurrence in the next year.

Magnitude/Severity

Based on the definitions set forth in previously, the magnitude and severity of lightning is classified as **limited**, with 10-25 percent of property severely damaged and/or shutdown of facilities for more than one week.

Overall Hazard Significance

Overall hazard significance is considered **medium**, due to risk to public safety, threat to facilities, power outages and property and natural resource damage caused by fire ignitions or direct strike.

Severe Winter Storms

Description

Winter storms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Winter storms in Boulder County, including strong winds and blizzard conditions, can result in localized power and phone outages and closures of streets, highways, schools, businesses, and nonessential government operations. People can also become isolated from essential services in their homes and vehicles. A winter storm can escalate, creating life threatening situations when emergency response is limited by severe winter conditions. Other issues associated with severe winter weather include the threat of physical overexertion that may lead to heart attacks or strokes. Snow removal costs can also impact budgets significantly. Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly.

Geographic Extent

The geographic extent of severe winter storms is classified as **extensive**, with 50-100 percent of the planning area potentially affected. While certain sections of Boulder County have a significantly higher probability of impact from winter storms, all areas can potentially be affected by blizzard conditions, snow drifts, ice, wind and downed power lines. The highest point in the County is 14,255 feet and the lowest is 4,986 feet. Over 50 percent of the County is 6,000 feet or above in elevation and therefore located in areas with significant risk of winter storm impacts in any given year. The Colorado Front Range Gust Map and Snow Load Design Data for Colorado (available through the Boulder County Land Use Department) indicates a pattern of more intense of winter storms in western Boulder County correlating with increases in elevation. While this map does not represent direct observations for wind intensity and snow depth, it does indicate the need for more robust building design standards to the west and as elevation increases.

Previous Occurrences

Both the western and eastern portions of Boulder County receive snowfall on a regular seasonal basis, predominantly from October through April; however, the western portion of the County receives substantially more snow than the eastern portion. The following summarizes the effects of snow in the County of Boulder based on data from the Western Regional Climate Center.

The Western Regional Climate Center reports data from two weather stations in Boulder County: Boulder and Gross Reservoir (in the foothills). Table 4.9 contains snowfall and snow depth summaries for the two stations.

Table 4.9. Snowfall and Snow Depth Summaries¹ Boulder County

Station	Average Annual Snowfall	Snowiest Month/Ave Snowfall	Highest Daily Snowfall	Highest Monthly Snowfall	Highest Seasonal Snowfall	Average Snow Depth
Boulder						
1893-2012	79.4	March/16.1	22.1 10/25/1997	56.7 March 1970	142.6 1908-1909	1
Gross Reservoir						
1978-2012	108.6	March/23.0	28.0 3/7/1990	63.0 March 2003	176.3 1979-1980	1

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

Note: All snowfall and snow depths are reported in inches.

Per the Historic Hazard Event worksheets provided by Jamestown, the following winter snow storm events have occurred:

Seasonally, Dec. to Feb. —Regular winter snow storms

March 2003—A winter snow storm dumped up to 60 inches of snow. The town was without electricity and phone service for three days.

Significant storms over the past few years include March 2003 (over six feet of snow), March 1992 (20 inches), March 1990 (24 inches), December 1982 (24 inches), and December 1987 (over 24 inches). Boulder County was included in both the 2003 and 2006 Presidential Emergency declarations for snowfall.

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Data from the National Climatic Data Center and SHELDUS identified 190 winter storm events between January 1, 1993 and November 30, 2007, which impacted Boulder County or its major forecast zones (Z035 and Z039). Of these, the following events resulted in reported injuries and/or property damage:

February 11, 1994—Heavy snow, two injuries, property damage of \$50,000. Moist upslope winds and an upper-level system produced heavy snow over portions of the Front Range. Amounts ranged from 6 to 12 inches.

January 28, 1995—Heavy snow, two deaths, property damage of \$25,000. All mountains, northeast Front Range. A strong, very moist, and slow moving winter storm system struck Colorado. In the high country, all mountain ranges received at least three feet of snow with some locations in the Elk Mountains collecting six to eight feet. Two people were killed by avalanches during the week. Road closures were common in the high country due to poor visibilities and avalanches. Interstate 70 was closed when an avalanche crossed the westbound lanes west of the Eisenhower Tunnel. At lower elevations, including the foothills and northern Front Range, the snow started falling the morning of the 10th. Most of the snow fell during the 24-hour period after onset. Locations in and near the foothills received the most snow as they collected between 10 and 15 inches. Golden and south sections of Boulder County collected 15 and 14 inches, respectively.

February 8, 1995—Blizzard, property damage of \$3.1 million. The storm that moved into eastern Colorado developed into a blizzard across the northeast plains as an intense surface cyclone formed. The combination of freezing rain, followed by heavy snow and damaging winds led to widespread electrical outages. Snowfall totals generally ranged from 6 to 18 inches. The heaviest snow occurred near the Front Range foothills; the Palmer Divide; in the area from just south of Denver, east and northeast into northern Lincoln and Washington counties; and near the Nebraska state line. Sustained winds from 35 to 58 mph with gusts to around 75 mph were recorded. Denver International Airport was completely shut down for the first time in its brief history. Power surges and outages constantly crippled the airport's massive computer system. The airport was closed at 5:00 a.m. and did not reopen until mid-afternoon. Power outages affected nearly all of northeast Colorado. Some areas only had scattered outages for a few hours, while more remote areas were blacked out for over a week. As a result, most businesses were closed and school classes canceled. The only businesses that remained open during the storm were those using backup generators. Overall, 220,000 Xcel Energy customers were affected, making it the worst outage in the company's history.

March 17, 2003—Blizzard, property damage of \$62 million. A very moist, intense, and slow moving Pacific storm system made its way across the four corners area and into southeastern Colorado from March 17-19, allowing for a deep easterly upslope flow to form along the Front Range. The storm dumped 31.8 inches of snow at the former Stapleton International Airport, enough for second place in the Denver weather history record book. The storm also placed March 2003 in first place for the snowiest March in Denver history and fifth place for the wettest March on record. In addition, the storm broke a 19-month streak of below normal precipitation in Denver. The heavy wet snow caused roofs of homes and businesses to collapse across the urban corridor. The snow also downed trees, branches, and power lines. Up to 135,000 people lost power at some point during the storms, and it took several days in some areas to restore power. Avalanches in the mountains and foothills closed many roadways, including Interstate 70 in both directions, stranding hundreds of skiers and travelers. Denver International Airport was also closed, stranding approximately 4,000 travelers. In all, the estimated cost of the damage to property alone (not including large commercial buildings) was \$93 million, making it

easily the costliest snowstorm ever in Colorado. According to this NCDC report, the second costliest snowstorm was the 1997 blizzard, where damage totaled \$10.5 million (see description in the following grouping of events). The areas hardest hit by heavy snow were the northern mountains east of the Continental Divide, the Front Range foothills, and Palmer Divide, where snowfall totals ranged from three feet to more than seven feet. Boulder County received 22.5 inches of snow. Tree cleanup costs for this storm and a subsequent storm in May were estimated at \$3,000. Figure 4.16 shows total estimated snowfall for this storm.

December 20, 2006—This storm resulted in a presidential emergency declaration. Some of the largest snowfall totals during this event ranged from 21 inches in Fort Collins to 42 inches at Conifer, southwest of Denver. Meteorologists at the National Weather Service office in Boulder measured 19 inches of snowfall. This blizzard forced the closure of interstates, businesses, schools, and airports, stranding thousands of holiday travelers. This storm resulted in a Presidential snow emergency declaration. Eligible snow removal reimbursement costs in Boulder County totaled \$279,044 federal share, and \$93,014 local share, for \$372,058 total. The St. Vrain Valley School District reported that 20 employees, 6 visitors and 59 students reported injuries. The employee injury costs were \$97,736. Snow removal expenses amounted to \$32,846 and the disaster relief funding from FEMA was \$23,679.29. There was also a report of some vehicle damages as well as school and road closures.

January 7, 2007—Strong winds associated with an intense upper level jet, and a very strong surface pressure gradient, developed in and near the Front Range Foothills. Peak wind gusts ranged from 77 mph to 115 mph. The strong winds coupled with freshly fallen snow resulted in whiteout conditions and several highway closures due to blowing and drifting snow. Road closures included: State Highway 93, between the cities of Golden and Boulder; and State Highway 36, from the Boulder Turnpike, in Broomfield, to South Boulder Road; More than 100 people were stranded in their cars between Golden and Boulder as blowing and drifting snow made the highway impassable. Snow drifts along State Highway 93 were over 6 feet in depth. Up to twenty cars were also abandoned along the Diagonal Highway, between Boulder and Longmont. Thirty vehicles were stranded along State Highway 128. The high winds also caused intermittent power outages in Boulder County.

February 16, 2007—A strong upper level jet stream over northern Colorado, coupled with a passing weather disturbance, brought a one-two punch of heavy snow and strong winds to areas in and near the Front Range. At the National Wind Technology Center, the peak wind gust topped out at 101 mph. In and near the Front Range Foothills, the wind stirred up intense ground blizzards which resulted in several road closures. State Highway 93, between Golden and the city of Boulder was closed for much of the day.

Other winter storm events identified by the HMPC include the following:

May 1978—The spring storm of 1978 dropped 30 inches of snow on Boulder County and was responsible for at least one death and a serious injury. It also collapsed an old hotel building (the Arnett Hotel) on Pearl Street across from the *Daily Camera*. The snow started before dawn on Friday, May 5, accumulating about 8 inches in town and 26 in the foothills by later that day. It snowed all day Saturday and into Sunday.

Christmas storm of 1982—The storm began on Christmas Eve, lasting through Christmas Day. Winds created large drifts, closing roads and stranding travelers.

December 24-29, 1987—20 inches of snow fell over a period of a few days. Countywide snow removal operations were estimated at \$280,000.

March 6, 1990—More than two feet of wet snow dumped in the foothills, paralyzing traffic, stranding travelers, preventing mail delivery, and causing hundreds of accidents and power outages in Boulder County. Winds of 37 mph qualified the storm as a blizzard.

November 17, 1991—The October 1991 freeze (“Halloween Freeze”) saw temperature extremes from 60°F to below 0°F. This snowstorm combined with a freeze the previous month caused \$51,250 in tree damage.

March 9, 1992—Twenty inches of snow fell in Boulder County. The storm began early in the afternoon with spring-like thunder and lightning and turned winter-like in about one hour. More than 25,000 residents were without electricity when wet, wind-driven snow toppled power lines. Many cars were stranded on Highway 36 between the city of Boulder and Denver, and on Highway 93 between Boulder and Golden. The storm caused \$32,045 in tree damage (an additional \$20,000 was spent on pruning and \$23,600 on removal).

September 20, 1995—This storm damaged 80-90 percent of the tree population in the city of Boulder. Total damage and associated costs equaled \$363,710.

April 24, 1997—A snowstorm dumped over 16 inches of snow in Boulder County; mountain areas received around 30 inches.

October 24, 1997—During this “Blizzard of 1997,” Boulder County received 30 inches of snow in 48 hours. A total of 51 inches fell in Coal Creek Canyon. Power outages were sporadic and tree breakage was minimal. Areas south and east of Boulder County were impacted more by the storm than Boulder County due to high winds that created blizzard conditions. The storm resulted in five deaths, two injuries, and significant dollar losses. This storm was the largest October storm in county history and ranked as the fourth largest snowstorm on record. Snow totals made the 1997 calendar year the snowiest on record with a total of approximately 130 inches. Estimated tree cleanup costs were \$7,000.

Fall 2000—Tree cleanup costs were estimated at \$2,000.

December 28, 2006—This large storm arrived a mere week after another winter storm of significance (see above).

December 12, 2012—Damaging winds developed in and near the Front Range. A peak wind gust to 104 mph was recorded in the foothills of Boulder County. In Boulder, the high winds knocked down several trees, power poles and electrical lines. Some of the fallen trees damaged homes and automobiles. In the mountains, the combination light to moderate snow driven by high winds, produced blizzard conditions above timberline. Storm totals generally ranged from 3 to 8 inches.

Peak wind gusts included: 104 mph in south Boulder; 98 mph, 3 miles southwest of Pinecliffe; 95 mph, 2 miles northwest of Rocky Flats; 92 mph, along State Highway 93 near Marshall; 87 mph atop Berthoud Pass and in Boulder Canyon; 80 mph, 5 miles west-northwest of Boulder; 83 mph at NCAR Mesa Lab; 78 mph, 8 miles northeast of Four Corners; 79 mph at the National Wind Technology Center; 76 mph at Wondervu; 75 mph atop Loveland Pass and the NCAR Foothills Lab in Boulder; 74 mph at Blue Mountain, Boulder Municipal Airport, 9 miles east of Dillon and 1 mile northwest of Lyons; 73 mph, 4 miles east-northeast of Nederland; 72 mph at the Junction of State Highways 72 and 93. Other storms with measurable snowfall include the following:

December 4-5, 1913—43 inches

November 2-5, 1946—31 inches

January 23-27, 1948—21 inches

April 7-11, 1959—26 inches

March 29-31, 1970—26 inches

September 17-18, 1971—21 inches

May 5-6, 1978—31 inches

November 20, 1979—22 inches

November 26-27, 1983—23 inches

January 5, 2007—17 inches

May 3-5, 2007—14.5 inches

December 12, 2007 – 11 inches

January 12, 2009 – 9 inches

April 18, 2009 – 2 feet

October 29, 2009 – 20 -46 inches in the mountains and 12-26 inches in the urban corridor.

April 03, 2011- 16 inches

February 12, 2012 4 feet mountains and 12 inches in the urban corridor

January 3, 2014- 2 feet

Probability of Future Occurrences

Based on patterns of previous occurrences, future probability is considered **highly likely**, with impacts attributed to severe winter storms occurring on an annual basis at locations within the planning area.

Magnitude/Severity

Based on the definitions set forth in previously, the magnitude and severity of severe winter storms in Boulder County is considered **catastrophic**, with more than 50 percent of property severely damaged and/or shutdown of facilities for more than 30 days and/or multiple fatalities.

Overall Hazard Significance

Based on assessments of probability, geographic extent and magnitude/severity, the overall hazard significance of severe winter storms is considered **high**.

Subsidence

Description

The Colorado Geological Survey defines land subsidence as the sinking of the land over manmade or natural underground voids. In Boulder County, the type of subsidence of greatest concern is the settling of the ground over abandoned mine workings. Past coal and clay mining activities have created surface subsidence in some areas and created the potential for subsidence in other areas.

Subsidence can result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate the natural processes of subsidence. Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the empty space previously occupied by water or soluble minerals. The consequences of improper use of land subject to ground subsidence can be excessive economic losses, including the high costs of repair and maintenance for buildings, irrigation works, highways, utilities, and other structures. This results in direct economic losses to citizens as well as indirect economic losses through increased taxes and decreased property values.

Room and pillar mining is the mining technique used almost exclusively in early Colorado mining. In the room and pillar technique, a shaft or adit was driven or dug to the layer of coal. Passageways were excavated in the coal seam and openings or rooms of coal were dug out on either side of the tunnel. Between the rooms, pillars of coal were left in place to support the roof of the mine. When the coal was “ran out”, the miner’s started to “pull pillars” at the back of the mine. Ideally, pillars were removed until the roof started to cave in and settle. In reality, pillars were not always removed in a systematic manner and many pillars were left to support the roof.

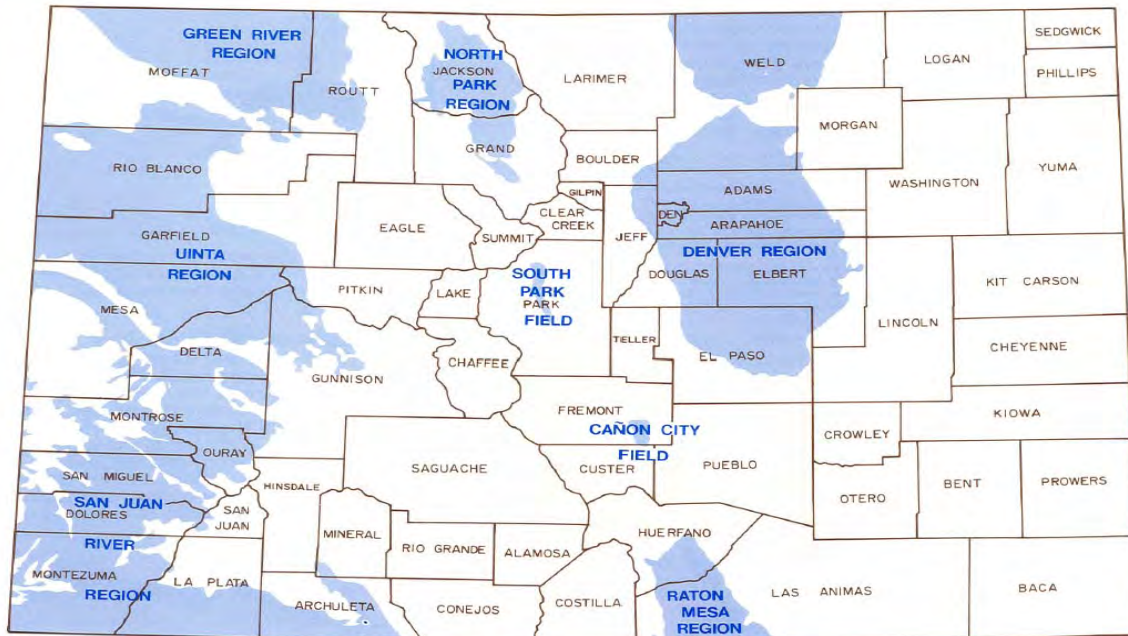
In some cases, coal was “poached” or more coal was removed from an area than would be noted on the mine map. Also, many mines were mislocated relative to surface features due to surveying errors. Consequently, the precise location and extent of underground mines can be difficult to determine. The possible inaccuracies in mining records and the ability to determine present mine conditions combine to make subsidence resulting from room and pillar mining unplanned and unpredictable.

Geographic Extent

Based on information included in the state hazard mitigation plan, a substantial area within Boulder County is a major mining district and a portion of the southeastern county is a coal region. As previously noted, there is a direct correlation with areas of current or previous coal production and land subsidence. Specifically, Figures 13 and 14 below indicate an area in the southeast section of the County where coal deposits and/or abandoned coal mines are located. Based on the size of these areas relative

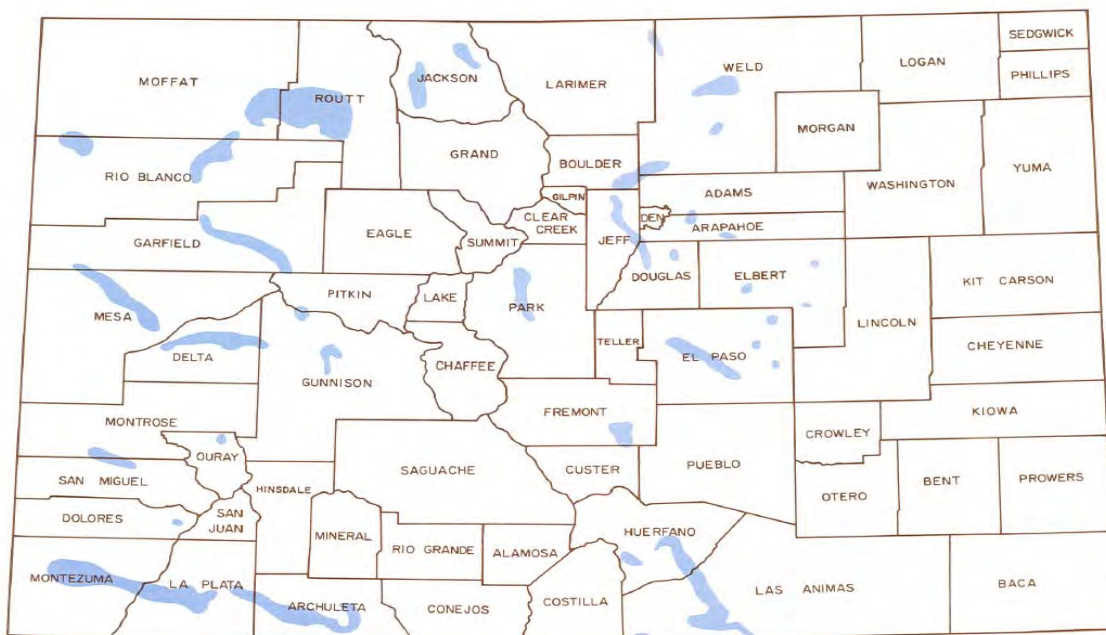
to the County overall, the geographic extent of land subsidence is considered **significant**, with 10-50 percent of the planning area affected.

Figure 4.6. Coal Deposits by Region, State of Colorado



Source: Subsidence above Inactive Coal Mines

Figure 4.7. Locations of Inactive Coal Mines, State of Colorado



Source: Subsidence above Inactive Coal Mines

Previous Occurrences

Records of previous subsidence occurrences are difficult to track, as there are no coordinating or monitoring agencies for this hazard. A recent event in fall of 2007 involved the closure of a sunken road due to a coal mine collapse near the town of Erie. A 1986 study on land subsidence in southeastern Boulder County conducted by the State of Colorado Department of Natural Resources Mined Land Reclamation Division found evidence of 595 subsidence occurrences across a 50 square mile study area. The report also found extensive evidence of wall and foundation damage in a survey of homes in the Lafayette and Louisville area, directly attributed to undermining from abandoned coal shafts.

Boulder County is second in the state in terms of number of abandoned mines with 183 abandoned coal mines and 3,600 abandoned mines of other types. In Lafayette in 1974, an abandoned coal mine created a sinkhole in a trailer park area that expanded to 25 feet deep and 25 feet in diameter in about a 24-hour period.

Probability of Future Occurrences

Based on patterns of previous occurrence and the numerous locations of abandoned coal mines in the planning area, probability of future occurrence is considered **likely**, with a recurrence interval of significant impacts estimated at 10 years or less.

Magnitude/Severity

Magnitude and severity of land subsidence is classified as **limited**, with 10-25 percent of property at risk of severe damage.

Overall Hazard Significance

Based on assessments of probability, geographic extent and magnitude/severity, the overall hazard significance of land subsidence is considered **medium**, with moderate potential impact.

Tornado

Description

Tornadoes form when cool, dry air sits on top of warm, moist air. In the plains areas of Colorado, this most often happens in the spring and early summer (i.e., May, June, and July) when cool, dry mountain air rolls east over the warm, moist air of the plains.

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist. They can have the same pressure differential that fuels 300-mile-wide hurricanes across a path less than 300 yards wide. Closely associated with tornadoes are funnel clouds, which are rotating columns of air and condensed water droplets that unlike tornadoes, do not make contact with the ground.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 15 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity. Table 16 shows the wind speeds associated with the Enhanced Fujita Scale ratings. The Enhanced Fujita Scale's damage indicators and degrees of damage can be found online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 4.10. Original Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	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	158-206	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	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center,
www.spc.noaa.gov/fag/tornado/f-scale.html

Table 4.11. Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center,
www.spc.noaa.gov/fag/tornado/ef-scale.html

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, most injuries and deaths result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response.

Geographic Extent

While the potential for tornado occurrence is present throughout the planning area, probability is significantly higher for the eastern sections of the County. Based on this the geographic extent of tornadoes is classified as **significant**, with 10-50 percent of the planning area potentially affected.

Previous Occurrences

According to the Denver Museum of Nature and Science, Colorado's tornado activity rivals that of Tornado Alley. Nevertheless, Colorado tornadoes tend to be small, short-lived, and relatively weak as compared with tornadoes in the plains states. Statistics indicate that Colorado tornadoes last only a few minutes, are generally only about 100 yards in diameter at the surface, and have an average path length of 1½ miles. Wind speeds appear to average 100 mph or less.

The National Climatic Data Center's 2013 Annual Summaries indicates that based on state-level tornado data from 1991 to 2010, Colorado ranks 6th for frequency of tornadoes. Tornadoes are rare and usually only affect the lower elevations in the eastern portion of Boulder County. The National Climatic Data Center documents 10 incidents of tornadoes and 7 funnel clouds in Boulder County between January 1, 1950, and December 30, 2012. Information on these events is detailed below:

September 17, 1953, 3:00 p.m.—Magnitude F1, property damage of \$3,000

May 12, 1955, 4:30 p.m.—Magnitude F1, property damage of \$3,000

May 17, 1978, 3:45 p.m.—Magnitude F1, property damage of \$3,000

April 30, 1980, 11:00 a.m.—Magnitude F1, no property damage

October 15, 1980, 6:22 p.m.—Magnitude F2, property damage of \$25,000 (roof at Vo-Tech on East Arapahoe)

June 5, 1988, 3:25 p.m.—Magnitude F2, property damage of \$250,000

June 1, 1990, 5:03 p.m.—Magnitude F0, no property damage

June 6, 1995, 4:45 p.m.—Funnel cloud (3 miles south of Lafayette)

June 17, 1995, 5:50 p.m.—Funnel cloud (Broomfield)

June 20, 1995, 1:47 p.m.—Funnel cloud (4 miles west of city of Boulder)

June 16, 1996, 4:15 p.m.—Magnitude F1 (Pinecliff), no property damage

July 12, 1996, 7:40 p.m.—Magnitude F0 (Broomfield), no property damage

June 6, 1997, 1:15 p.m.—Magnitude F1, no property damage (Other sources indicate a home was damaged in the vicinity of Baseline Reservoir during this event.)

May 22, 2008 11:00 am – 3 funnel clouds (Longmont, Erie, and Superior)

June 8, 2009, 1:00 p.m. – Funnel cloud (Lafayette)

June 9, 2009, 4:35 p.m. – Funnel cloud (Broomfield)

Probability of Future Occurrences

Based on patterns of previous occurrences, future probability is considered **likely**, with a 10-100 percent chance of occurrence in the next year.

Magnitude/Severity

Based on assessment of impacts from previous occurrences, magnitude and severity is classified as **limited**, with 10-25 percent of property severely damaged and/or shutdown of facilities for more than one week.

Overall Hazard Significance

Based on assessments of probability, geographic extent and magnitude/severity, overall hazard significance of tornadoes is considered **medium**.

Wildfire

Description

Wildfire and urban wildfire are an ongoing concern for Boulder County and the state of Colorado. Generally, the fire season extends from spring to late fall. 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. The wildfire risk is predominantly associated with the wildland-urban interface, areas where development is interspersed or adjacent to landscapes that support wildland fire. A fire along this wildland-urban interface can result in major losses of property and structures. Significant wildfires can also occur in heavily populated areas. Rangeland and grassland fires are a concern in the eastern portion of Boulder County, including urbanized areas, due to increased residential development in the urban-wildland interface.

Generally, there are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather.

Fuel—Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also to be considered as a fuel source are manmade structures, such as homes and associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. In addition, “ladder fuels” can spread a ground fire up through brush and into trees, leading to a devastating crown fire that burns in the upper canopy and cannot be controlled. The volume of available fuel is described in terms of fuel loading. Certain areas in and surrounding Boulder County are extremely vulnerable to fires as a result of dense vegetation combined with a growing number of structures being built near and within rural lands. The presence of fine fuels, 1,000 hour fuels, and needle cast combined with the cumulative effects of previous drought years, vegetation mortality, tree mortality, and blowdown across Boulder County has added to the fuel loading in the area. Fuel is the only factor that is under human control.

Topography—An area's terrain and land slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

Weather—Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater the wind, the faster a fire will spread, and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Lightning also ignites wildfires, which are often in terrain that is difficult for firefighters to reach. Drought conditions

contribute to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases.

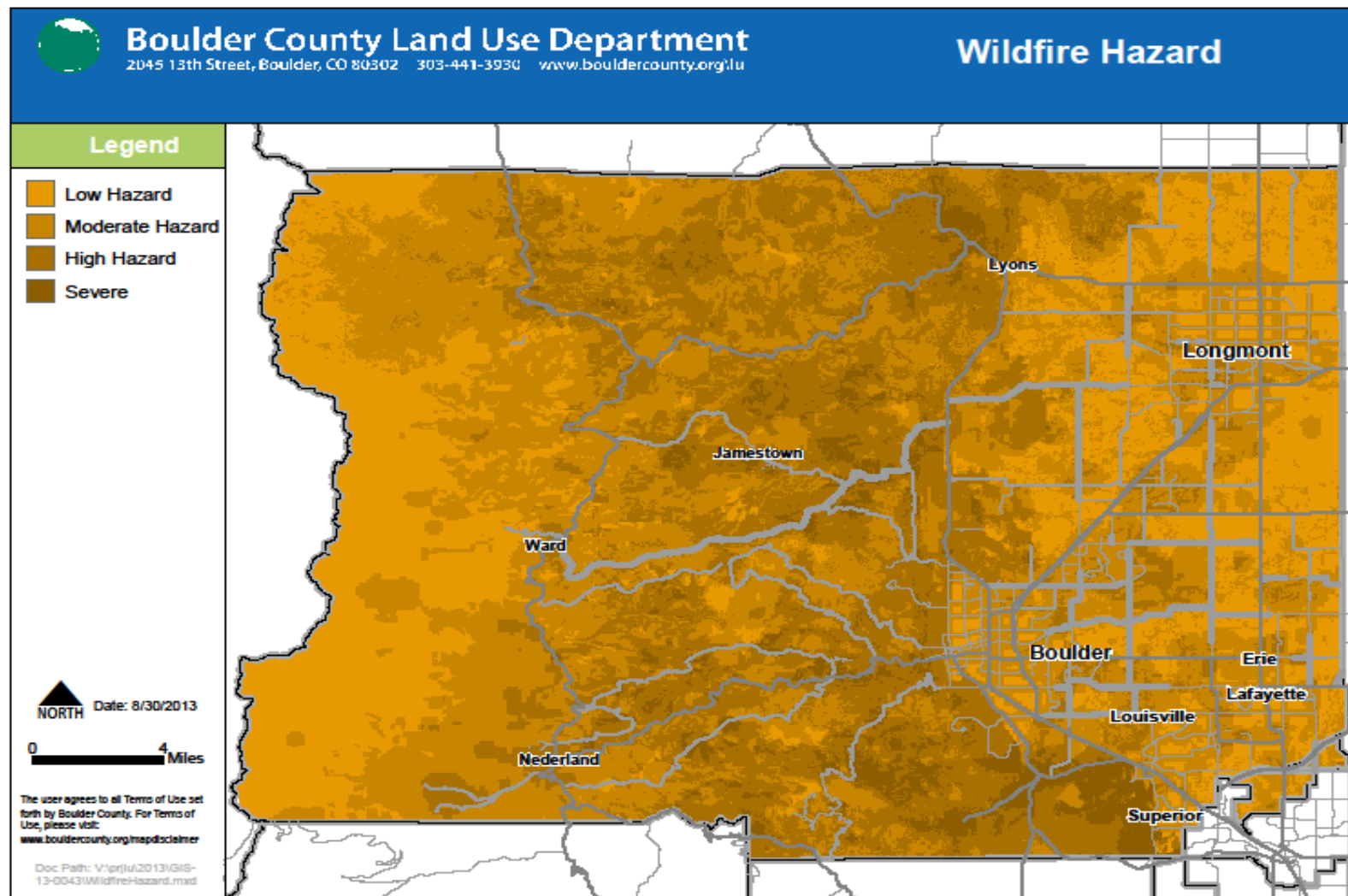
Potential losses from wildfire include human life; structures and other improvements; natural and cultural resources; quality and quantity of the water supply; assets such as timber, range and crop land, and recreational opportunities; and economic losses. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can lead to secondary impacts or losses, such as future flooding and landslides during heavy rains.

Geographic Extent

Much of the County is susceptible to wildland fires, with highest risk areas located in the Front Range foothills and to a lesser extent along the Continental Divide. Figure 17 below represents relative wildfire severity in Boulder County under the assumption of moderate to high fire hazard conditions. The fire hazard assessment for this map considers the physical attributes of slope, aspect, and vegetation fuel type and is also based on the U.S. Forest Service's fire behavior model BEHAVE and Van Wagner's crown fire spread equations. The classification does not take into account the probability of where a wildfire could occur or what could be impacted by a wildfire, nor does it take into account the location of dangerous topographic features such as chimneys and V-shaped canyons. The hazard layer was completed in 2011 by the Boulder County Land Use Department as part of the Boulder County Wildfire Hazard Identification and Mitigation System.

Within Colorado, Boulder County has the highest number of residential structures within 500m of public wildland and ranks tenth overall in the west in terms of existing wildfire risk. Based on this assessment the geographic extent is classified as **significant**, with 10-50 percent of the planning area potentially affected

Figure 4.8. Wildfire Hazard, Boulder County



Previous Occurrences

According to the Colorado State Forest Service, vegetation fires occur on an annual basis; most are controlled and contained early with limited damage. For those ignitions that are not readily contained and become wildfires, damage can be extensive. There are many causes of wildfire, from naturally caused lightning fires to human-caused fires linked to activities such as smoking, campfires, equipment use, and arson.

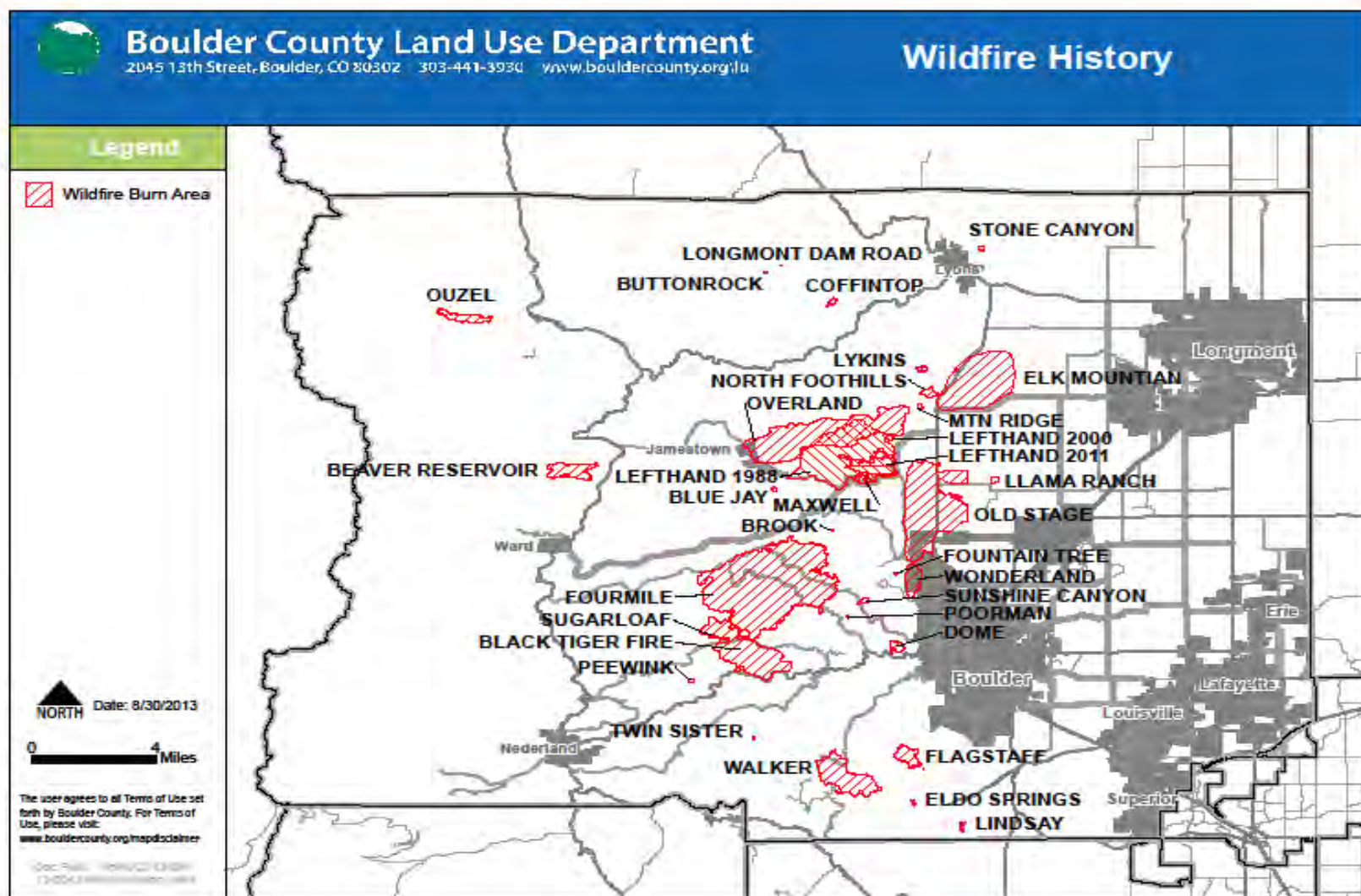
The 2002 wildfire season was the worst in Colorado history. Recent wildfire history in Colorado is summarized in Table 4.12 and Figure 4.8 below.

Table 4.12. Recent Colorado Wildfire History

Year	Number of Wildfires	Number of Acres Burned
2013	1,176	195,145
2012	1,498	246,445
2011	1,286	161,167
2010	1,076	40,788
2009	1,190	50,456
2008	1,133	141,966
2007	1,351	20,739
2006	2,025	94,484
2005	1,364	27,390
2004	1,290	24,996
2003	2,027	27,655
2002	3,067	926,502

Source: National Interagency Fire Center

Figure 4.8 Wildfire History, Boulder County



Boulder County has experienced numerous wildfires dating back to June 29, 1916. Details are provided below.

June 29, 1916—1,000 acres burned around Bear Mountain.

July 5, 1924—1,600 acres burned near Nederland.

August 9, 1978—Fire caused by lightning burned more than 1,000 acres in the northwestern portion of Boulder County in Rocky Mountain National Park.

October 6, 1980—A fire caused by an arsonist burned 150 acres in the Pine Brook Hills subdivision, destroying a \$150,000 home.

September 1988—The Lefthand Canyon fire (1,500 acres) and Beaver Lake fire (700 acres) occurred in the canyon above Buckingham Park and close to Beaver Lake near Ward. Houses were threatened, but no structures were lost. Both were thought to be human-caused fires.

July 9, 1989—The Black Tiger fire destroyed 44 homes on Sugarloaf Mountain, 14 miles southwest of Lyons, and burned over 2,100 acres. Hot temperatures, low humidity, and gusty winds contributed to this human-caused fire. Costs were estimated at \$10 million.

November 24, 1990—Olde Stage Road fire, considered the fourth major wildfire in Boulder County, started when a man threw a burning mattress out his front door. Wind gusts up to 80 mph fanned the fire out of control. Ten homes, five out-buildings, and approximately 3,000 acres were burned in the fire.

September 15, 2000—Walker Ranch/Eldorado fire, likely a human-caused fire, burned approximately 1,061 acres. No structures were lost; but over 250 homes were threatened. Firefighting costs were estimated at \$1.5 million. A FEMA fire management assistance declaration was made to help cover firefighting costs. This area had previously undergone fuels treatment, which mitigated the severity of the fire. The fire is suspected to be human-caused.

June 19, 2002: All but five Colorado Counties are part of a federal disaster declaration (DR-1421) as a result of an extended period of wildfire activity.

October 29, 2003—The Overland fire likely started when the top half of a tree that was sheared off by 60 mph winds fell onto a power line on or near the Burlington Mine cleanup site in northwest Jamestown. High winds and dry weather conditions existed. 3,500 acres were burned; 12 residences and several outbuildings were destroyed. Firefighting costs were approximately \$400,000. FEMA approved a request from the governor for federal fire management assistance. Property damage was estimated in excess of \$8 million but no infrastructure damage was reported. The town was evacuated and roads and schools were closed for 24 hours.

February 14, 2006—The Elk Mountain fire consumed an estimated 600 acres of brush and grassland. The fire originated in a pile of fireplace ashes that had been dumped outside of a mobile home. The gusting winds spread the hot ash, igniting nearby grasses that were tinder-dry after a prolonged period of dry, hot weather. Winds pushed the fire into a blaze that expanded rapidly, threatening at least three homes. No structures were lost, and damage was largely limited to fences, an apple orchard, and two old farm trucks.

September 6-16, 2010 – The Fourmile Canyon fire burned 6200 acres and destroyed 169 structures. The fire started when a resident did not fully extinguish a fire in a fire pit. High winds fanned the embers and the subsequent fire grew rapidly. The fire started in Emerson Gulch and impacted the communities of Four mile, Sunshine, and Gold Hill.

Other notable fires (greater than 50 acres in size) in Boulder County include the following:

November 1, 1964—Near Eldorado Springs (100 acres)
May 28, 1974—Near Gold Hill (160 acres)
June 1976—Comforter Mountain (256 acres)
August 1979—Coal Creek Canyon (50 acres)
September 21, 1984—U.S. Forest Service land near Lyons (60 acres)
August 1, 1987—Between Boulder and Lyons (50 acres)
November 4, 1987—Southwest of Highway 36 (100 acres)
February 21, 1988—Sunshine Canyon (200 acres)
September 7, 1988—North of Ward (160 acres)
July 15, 1991—West of Boulder Hills subdivision, (135 acres)
July 14, 1994—Near Ward (50 acres)
September 3, 1996—Rabbit Mountain, Lyons (50 acres)
September 1, 2005—North Foothills fire, Foothills Ranch subdivision above Mt. Ridge/Lake of the Pines area (55 acres)
October, 2010- The Dome Fire to the west of the City of Boulder and was 800 acres and threatened homes.
June 26, 2013- Flagstaff Fire was started by lightning causing home evacuations but no structures were lost. The fire was 300 acres in size.

Probability of Future Occurrences

Based on historical data, Boulder County experienced at least 23 significant (>50 acres) fires since 1916. This relates to a four year recurrence interval or a 25 percent chance of wildfire in any given year. Smaller wildfires occur on an annual basis, either in forests or in grasslands within the planning area. Based on these assessments, future probability is classified as **highly likely**, with a near 100 percent chance of occurrence in a given year.

Magnitude/Severity

Based on the definitions established for this plan, magnitude and severity of wildfire is considered **critical**, with 25-50 percent of property severely damaged and/or the potential shutdown of facilities for at least two weeks.

Overall Hazard Significance

Based on assessments of probability, geographic extent and magnitude/severity, the overall hazard significance of wildfire is classified as **high**, with widespread potential impact.

Windstorm

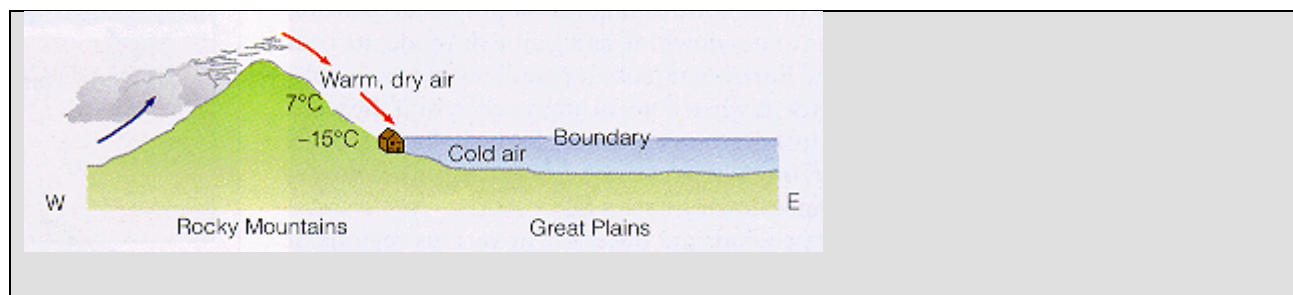
Description

High winds can result in property damage and injury and are a frequent occurrence throughout the region that includes Boulder County. Strong wind gusts can rip roofs from buildings, snap power lines, shatter windows, down trees, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, debris blocking streets, dust storms, and occasional structure fires. Windstorm types that are prevalent in Boulder County include the following:

Chinook Winds

Downslope winds in the region of Colorado that includes Boulder County are referred to as Chinook winds, after the Native American tribe of the Pacific Northwest. These downslope winds can occur with violent intensity in areas where mountains stand in the path of strong air currents. These warm and dry winds occur when the winds from the west blow across the Continental Divide from the west and descend from the foothills and out onto the plains (see Figure 20). They are caused by high pressure conditions west of Boulder County, low pressure over and/or east of the County, and strong westerly winds in the mountains.

Figure 4.9. Chinook Wind Pattern



Source: University of Colorado at Boulder ATOC Weather Lab
<http://wxpaos09.colorado.edu/windstorms/windstorms.htm>

Bora Winds

In general, Bora winds are downslope winds that replace relatively warm light wind conditions with cold temperatures and strong wind gusts. The specific Bora winds that affect Boulder County are relatively dry and cold and blow from the west. While their pattern onset is similar to Chinook winds, they are comprised of cold air, whereas a Chinook brings warmer and drier air. Generally but with certain notable exceptions, Bora winds are less extreme than winds generated during Chinook events.

Geographic Extent

The geographic extent of windstorm is considered **extensive**, with 50-100 percent of the planning area affected. While the entire county can be affected by strong winds, the western county foothills and communities located at the base of the foothills experience the highest winds speeds. High alpine areas

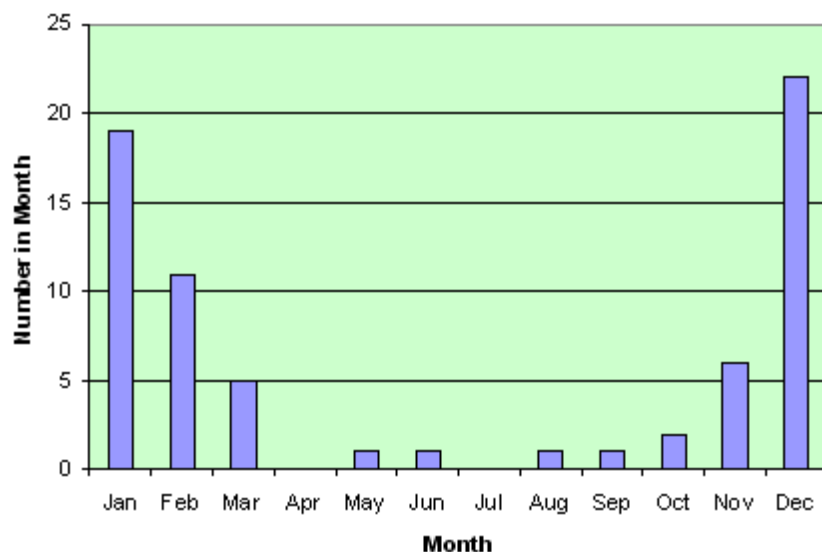
of the county are also subject to high winds but the impacts in these locations is limited mostly to resource damage due to lower density of development. The Colorado Front Range Gust Map and Snow Load Design Data for Colorado provided by the Boulder County Land Use Department indicates general patterns of wind intensity through the prescription of more stringent wind shear design standards in western sections of the county.

Previous Occurrences

High wind events are one of the most notable natural hazards affecting Boulder County. According to NOAA's Climate Diagnostics Center, the County experiences some of the highest peak winds in the United States. Locations within the planning area experience wind gusts in excess of 100 mph with nearly annual frequency. Gusts have been measured as high as 147 mph. The National Center for Atmospheric Research (NCAR) reports that a severe windstorm in January 1982, comparable to the landfall of a Category 2-3 hurricane, resulted in more than \$17 million in damages and extensive structural impacts in Boulder County.

The peak of the wind season is December and January, but downslope windstorms have been recorded in every month except July.

Figure 4.10. Boulder County Wind Events over 90 mph, 1967-2002 by Month



Source: Daily Camera, Steve Jones

Historical windstorm events are summarized below:

Since 2007 there has been 82 days with winds above 90 m.p.h. with 51 days between January to May and 28 days from August to December. According to the National Climatic Data Center (NCDC), between January 1, 1955, and November 30, 2014, Boulder County experienced 173 wind events that reached wind speeds of at least 50 knots (57.6 mph).

Of these wind events, 2 was responsible for a death and 20 were responsible for injuries and/or property damage. Information on selected events provided by the NCDL from this period is detailed below. Note that costs may include damages across a multiple county region are not necessarily specific to Boulder County:

February 24, 1994—High winds, 96 knots (~110 mph), property damage of \$500,000

March 23, 1994—High winds, 67 knots (~80 mph), property damage of \$5,000

October 29, 1996—High winds, 88 knots (~103 mph), 1 death, 5 injuries, property damage of \$5.2 million

February 2, 1999—High winds, 110 knots (~127 mph), property damage of \$3 million

April 8, 1999—High winds, 100 knots (~115 mph), property damage of \$7.2 million

April 9, 1999—High winds, 85 knots (~98 mph), property damage of \$13.8 million.

May 20, 2001—High winds, 72 knots (~82 mph), 6 injuries, property damage of \$3.4 million

October 29, 2003—High winds, 70 knots (~81 mph), property damage of \$979,000

December 20, 2004—High winds, 88 knots (~102 mph), 3 injuries, property damage of \$3,400,000

December 5, 2005—High winds, 85 knots (~98 mph), high winds reportedly broke windows and caused roof damage, winds downed trees and power lines throughout Boulder County

January 8, 2007- Peak wind gusts included: 115 mph at the National Wind Technology Center near Eldorado Springs, 89 mph; 7 miles west-northwest of Berthoud, 78 mph at Lafayette, with 77 mph; 3 miles west-southwest of Boulder.

December 12, 2009- Very strong Chinook winds blasted areas in and near the Front Range Foothills of Larimer, Boulder and Jefferson Counties. The wind blew down trees and power poles, downed electrical lines and fences, and damaged homes and vehicles. Scattered power outages were reported all along the Front Range. In Metropolitan Denver alone, 24,000 Xcel customers were affected by the outages. Strong crosswinds also blew over some semi-trailers along Interstate 25, near the Wyoming state line. In Larimer County, two small wildfires were sparked by downed power lines in Rist Canyon and near the Laporte/Bellvue areas. Four planes were damaged at the Vance Brand Municipal Airport in Longmont; one was wrecked. Insurance companies estimated up to \$7 million in damage along the Front Range and adjacent plains, making it the 4th costliest windstorm to hit Colorado.

Peak wind gusts included: 111 mph, 3 miles north of Masonville; 98 mph at Carter Lake; 87 mph at the National Wind Technology Center; 86 mph, 2 miles north of Longmont and at Pinewood Lake; 81 mph, 3 miles east of Gold Hill; 78 mph, 2 miles west-southwest of Broomfield; 77 mph at Erie; 76 mph, 21 miles north of New Raymer and 75 mph at Lafayette.

December 12, 2009- Damaging winds developed in and near the Front Range. A peak wind gust to 104 mph was recorded in the foothills of Boulder County. In Boulder, the high winds knocked down several trees, power poles and electrical lines. Some of the fallen trees damaged homes and automobiles. A semi-trailer was blown on its side along State Highway 93 near Marshall. In Loveland, the strong winds downed power lines and caused scattered electrical outages, which affected approximately 150 residents. In the mountains, the combination light to moderate snow driven by high winds, produced blizzard conditions above timberline. Storm totals generally ranged from 3 to 8 inches.

Peak wind gusts included: 104 mph in south Boulder; 98 mph, 3 miles southwest of Pinecliffe; 95 mph, 2 miles northwest of Rocky Flats; 92 mph, along State Highway 93 near Marshall; 87 mph atop Berthoud Pass and in Boulder Canyon; 80 mph, 5 miles west-northwest of Boulder; 83 mph at NCAR Mesa Lab; 78 mph, 8 miles northeast of Four Corners; 79 mph at the National Wind Technology Center; 76 mph at

Wondervu; 75 mph atop Loveland Pass and the NCAR Foothills Lab in Boulder; 74 mph at Blue Mountain, Boulder Municipal Airport, 9 miles east of Dillon and 1 mile northwest of Lyons; 73 mph, 4 miles east-northeast of Nederland; 72 mph at the Junction of State Highways 72 and 93; 64 mph in Loveland; 62 mph, 6 miles west-northwest of Berthoud and Superior; 61 mph at Erie Municipal Airport and the CSU Campus in Fort Collins; and 60 mph, 10 miles northeast of Pawnee Buttes.

December 31, 2011- A fast moving upper level storm system, along with a deep low pressure system over Nebraska and high pressure building over Utah, combined to create a powerful windstorm across Northeast and North Central Colorado. In the mountains and foothills, several locations recorded wind gusts in excess of 100 mph. Numerous trees were knocked down throughout Arapahoe National Forest. One man was killed when he was impaled by a falling tree limb while driving along U.S. Highway 36, north of Boulder.

January 18, 2012- Damaging winds developed in and near the Front Range. A peak wind gust to 104 mph was recorded in the foothills of Boulder County. In Boulder, the high winds knocked down several trees, power poles and electrical lines. Some of the fallen trees damaged homes and automobiles. A semi-trailer was blown on its side along State Highway 93 near Marshall. In Loveland, the strong winds downed power lines and caused scattered electrical outages, which affected approximately 150 residents. In the mountains, the combination light to moderate snow driven by high winds, produced blizzard conditions above timberline. Storm totals generally ranged from 3 to 8 inches.

Peak wind gusts included: 104 mph in south Boulder; 98 mph, 3 miles southwest of Pinecliffe; 95 mph, 2 miles northwest of Rocky Flats; 92 mph, along State Highway 93 near Marshall; 87 mph atop Berthoud Pass and in Boulder Canyon; 80 mph, 5 miles west-northwest of Boulder; 83 mph at NCAR Mesa Lab; 78 mph, 8 miles northeast of Four Corners; 79 mph at the National Wind Technology Center; 76 mph at Wondervu; 75 mph atop Loveland Pass and the NCAR Foothills Lab in Boulder; 74 mph at Blue Mountain, Boulder Municipal Airport, 9 miles east of Dillon and 1 mile northwest of Lyons; 73 mph, 4 miles east-northeast of Nederland; 72 mph at the Junction of State Highways 72 and 93; 64 mph in Loveland; 62 mph, 6 miles west-northwest of Berthoud and Superior; 61 mph at Erie Municipal Airport and the CSU Campus in Fort Collins; and 60 mph, 10 miles northeast of Pawnee Buttes.

Other significant wind events identified by the HMPC include the following:

January 11, 1972—Winds gusting to 97 mph damaged 40 trailers at Boulder Valley Village, including three that burned. Damage was estimated near \$3 million.

January 17, 1982—In one of the most devastating windstorms in Boulder County, winds were clocked at 137 mph at NCAR. Twenty gusts in excess of 120 mph were measured during a 45-minute period. The southern section of the city of Boulder was the hardest hit area of the county. At least 15 people were treated for cuts and bruises at Boulder Community Hospital after being struck with flying debris and glass. Trees were uprooted, power lines toppled, roofs blown off, houses torn apart, and cars damaged. Damage totaled approximately \$17 million.

Previous occurrences of wind events resulting in fatalities in Boulder County include the following:

March 18, 1920—Three people were killed when a fire truck responding to a fire collided with a car.

January 7, 1969—One half of all the houses in the city were damaged by wind. Winds clocked at 96 mph downtown and 130 mph at NCAR. One person died when he was blown off a Cherryvale fire department truck that was responding to a grass fire near the Boulder Airport.

June 1969—A University of Colorado at Boulder student died while sailing under a parachute in 80 mph winds.

January 10, 1990—One person was killed in a three-car accident on the Boulder Turnpike two miles west of Broomfield. Winds gusting to 107 mph caused poor visibility.

October 29, 1996—A Boulder County man died as he was trying to secure his pop-up camper trailer during winds in excess of 100 mph. The trailer blew over on top of him. Trees were downed and cars and property damaged.

February 3, 1999—Downed power poles and tree limbs cut power to over 10,000 homes. The peak gust of 127 mph was recorded at Sugarloaf. 80 mph winds were recorded at Nederland, 98 mph winds in the city of Boulder, 120 mph winds in the town of Lafayette, 100 mph winds in Longmont, and 119 mph winds were recorded in Wondervu. Nearly a dozen power poles were toppled between Baseline Road and Arapahoe on 95th street near Lafayette. The roof of the Boulder County Jail sustained approximately \$150,000 in damage. Damage across the Front Range region was estimated at \$3 million.

April 8-10, 1999—High winds hit Boulder County on April 8, 1999, and then again on April 10 with 120 mph winds recorded at Sugarloaf, 100 mph winds recorded in southern sections of the city of Boulder, and 90 mph in Longmont. Trees were uprooted and semi-trailers overturned.

March 6, 2004—Tree cleanup costs were estimated at \$5,000.

June 2004—Tree cleanup costs were estimated at \$2,000.

June 6, 2007— Intense wind conditions occurred along the North Central Mountains, Front Range Foothills and Urban Corridor. 92 mph wind gusts were recorded at the city of Boulder. Several trees were uprooted across the Urban Corridor. Xcel Energy reported service outages in Boulder, Denver, Lakewood, Longmont and Windsor.

October 19, 2007—Strong winds developed in the Front Range Foothills and portions of the Northeast Plains. Peak wind gusts included: 78 mph at Georgetown, 70 mph at Estes Park, 62 mph; 3 miles east of Amherst, and 61 mph; 3 miles northeast of Wiggins.

Other significant storms with wind velocities above 90 mph or where damage occurred include the following:

October 1949—85 mph, 300-ton crane toppled Valmont Plant

January 15, 1967—125 mph, NCAR

June 25, 1969—123 mph, NCAR

January 24, 1970—122 mph, NCAR

January 25, 1971—147 mph, NCAR

December 11, 1973—120 mph, Marshall Mesa

November 26, 1977—119 mph, Davidson Mesa

December 4, 1978—148 mph, one death

January 24, 1982—140 mph, Wondervu

December 25, 1984—112 mph, \$100,000 damage

September 24, 1986—131 mph, \$100,000 damage

January 23, 1988—90 mph, damaged bridge on Highway 157

February 9, 1988—96 mph, 1,600 homes without power
May 7, 1988—110 mph, 12,000 residents without power; annual Boulder Kinetics event canceled
January 8, 1990—110 mph, minor damage
December 14, 1990—120 mph, roof, trees, and cars damaged
January 24, 1992—143 mph, NCAR, minor damage
January 3, 1995—104 mph, Boulder Airport
December 4, 1995—95 mph, NCAR, minor damage
November 13, 1995—124 mph, NCAR, power outages in Nederland, a downed power line started a wildfire in Pine Brook Hills
January 1, 2007- 100kts
December 29, 2008 – 96kts
January 7, 2009 – 93kts
November 12, 2011 – 100kts
December 31, 2011 – 101kts
December 31, 2011 - 109kts
January 18, 2012 – 90 kts

Probability of Future Occurrences

Based on the frequency of previous occurrences and the definitions established for this plan, future probability of occurrence is classified as **highly likely**, with nearly a 100 percent chance of occurrence in the next year.

Magnitude/Severity

Based on assessments of the typical impacts of windstorms, magnitude and severity is considered **critical**, with 25-50 percent of property severely damaged and/or shutdown of facilities for at least two weeks.

Overall Hazard Significance

Based on assessments of probability, geographic extent and magnitude/severity, the overall hazard significance of windstorm is classified as **high**, with widespread potential impact particularly in the foothills and western sections of the planning area.

Vulnerability assessment

With Boulder County's hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that the significant hazards would have on the County. The vulnerability assessment quantifies, to the extent feasible, assets at risk to natural hazards and estimates potential losses.

This vulnerability assessment followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*. The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard.

Methodology

The vulnerability assessment was conducted based on the significance of the hazard utilizing best available data. This assessment is an attempt to quantify assets at risk, by jurisdiction where possible, to further define populations, buildings, and infrastructure at risk to natural hazards. Note that this assessment was limited to the hazards that were considered medium or high in planning significance, based on HMPC input and the hazard profiles. This assessment is also limited by the data available for the high or moderate ranked hazards. The methods of analysis vary by hazard type and data available and are discussed further in Growth and Development Trends with each hazard analyzed. It is important to note that the various analyses are data driven, and that potential errors or omissions may exist in the data. In some cases these specific data limitations are noted, where known. The information presented is for planning level assessments only.

The avalanche, expansive soils, and extreme heat hazards are omitted from this vulnerability assessment. Generally these hazards were omitted because they were either low significance, research did not discover noteworthy damage in the past, or data did not support quantifying future losses.

Data to support the vulnerability assessment was collected and compiled from the following sources:

County and municipal GIS data (hazards, base layers, critical facilities and assessor's data);

FEMA's HAZUS-MH MR 3 GIS-based inventory data (January 2005)

Written descriptions of inventory and risks provided by participating jurisdictions;

Existing plans and studies; and

Personal interviews with planning team members, hazard experts, and County and municipal staff.

The scope of the vulnerability assessment is to describe the risks to the County as a whole. The vulnerability assessment first describes the assets in Boulder County, including the total exposure of people and property; critical facilities and infrastructure; natural, historic, and cultural resources; and economic assets. Development trends, including population growth and land status, are analyzed in relation to hazard-prone areas. Next, where data was available, hazards of high and medium significance are evaluated in more detail and potential losses are estimated. Data from each jurisdiction was also evaluated and is integrated here and noted where the risk varies for a particular jurisdiction from the rest of the planning area.

Assets at Risk

Total Exposure of Population and Structures

Table 4.13 shows the estimated total population and number of housing units for each jurisdiction in 2013.

Table 4.13. Maximum Population and Housing Unit Exposure by Jurisdiction, 2013

Jurisdiction	2013 Population Estimate	2013 Housing Units Estimate
City of Boulder	102760	44370
Town of Erie*	9028	3022
Town of Jamestown	282	141
City of Lafayette	26685	10620
City of Longmont*	90105	35602
City of Louisville	19469	8142
Town of Lyons	2102	910
Town of Nederland	1486	750
Town of Superior*	12833	4701
Town of Ward	154	101
Unincorporated Boulder County	44970	21442
Total County	309874	129801

Source: Colorado Demography Office,
www.dola.colorado.gov/dlg/demog/

*Partial estimate for Boulder County only

Assessments in this plan are based on two building inventories: one from Boulder County's Assessor's Office and the other from FEMA's HAZUS-MH MR3. Table 4.14 shows the property inventory from the Assessor's Office (March 12, 2008) for the entire County. Table 4.15 summarizes the property inventory for the unincorporated areas only. The parcel layer and Assessor Data Table were obtained from Boulder County in early March 2008. The accounts in the Assessor data undergo a full assessment in May of every odd year. Hence, actual values of the data are current as of May 2015. The only exception to this is when major improvements are made on a property.

Table 4.16 shows the value of the buildings in Boulder County from the inventory included with FEMA's HAZUS-MH MR3 (which is dated based on 2015 building inventory data by Census block. According to the assessor's data, the sum of the value of improvements in the County is \$28.6 billion (building exposure only, not including land value). HAZUS-MH estimates the value of the building stock to be approximately \$23 billion. The HAZUS-MH may not as accurately represent the replacement value of the real estate in the County. The count of buildings is 103,716 based on HAZUS and 101,956 based on the Assessor's data.

Table 4.14. Boulder County's Property Inventory, Assessor's Office

Property Type	Land Count	Land Value (\$)	Building Count	Building Value (\$)	Total Value (\$)
Residential	101,889	14,191,869,704	110,396	25,877,466,815	40,069,336,519
Agricultural	3,535	22,095,825	2,234	30,588,877	52,684,702
Exempt	5,348	2,689,966,708	1,758	1,903,819,393	4,593,786,101
Commercial	3,578	1,837,299,548	4,527	2,472,284,586	4,309,584,134
Industrial	898	536,431,089	1,222	1,155,697,094	1,692,128,183
Oil & Gas	316	24,109,590	0	0	24,109,590
Minerals	1,524	4,120,963	0	0	4,120,963
Vacant	4,912	534,864,814	0	0	534,864,814
Total	122,000	19,840,758,241	120,137	31,439,856,765	51,280,615,006

Source: Boulder County Assessor's Office, year-end 2014 data

Table 4.15. Unincorporated Boulder County Property Inventory, Assessor's Office

Property Type	Land Count	Land Value (\$)	Building Count	Building Value (\$)	Total Value (\$)
Residential	19,469	3,374,081,221	23,949	5,344,045,387	8,718,126,608
Agricultural	2,634	20,528,039	2,154	30,281,177	50,809,216
Exempt	2,753	1,093,125,172	582	134,524,473	1,227,649,645
Commercial	260	78,342,095	468	76,398,417	154,740,512
Industrial	76	42,320,139	142	64,059,033	106,379,172
Oil & Gas	226	20,348,207	0	0	20,348,207
Minerals	1,408	4,043,463	0	0	4,043,463
Vacant	1,718	139,512,523	0	0	139,512,523
Total	28,544	4,772,300,859	27,295	5,649,308,487	10,421,609,346

Source: Boulder County Assessor's Office, year-end 2014 data

Table 4.16 Boulder County's Property Inventory

Occupancy Type	Building Count	Building	Contents	Total
		Exposure (\$)	Exposure (\$)	Exposure (\$)
Residential	95,563	\$19,953,214,000	\$9,981,535,000	\$29,934,749,000
Commercial	1,894	\$2,686,816,000	\$2,891,650,000	\$5,578,466,000
Industrial	389	\$712,654,000	\$1,016,519,000	\$1,729,173,000

Agriculture	61	\$88,928,000	\$88,928,000	\$177,856,000
Religion	145	\$203,143,000	\$203,143,000	\$406,286,000
Government	94	\$68,149,000	\$74,838,000	\$142,987,000
Education	31	\$226,258,000	\$258,029,000	\$484,287,000
Total	98,177	\$23,939,162,000	\$14,514,642,000	\$38,453,804,000

Critical Facilities, Infrastructure, and Other Important Community Assets

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 1.) Essential Facilities are those that if damaged would have devastating impacts on disaster response and/or recovery. 2.) High Potential Loss Facilities are those that would have a high loss or impact on the community. 3.) Transportation and Lifeline Facilities comprise the third category of critical assets.

A fourth category called Other Assets has been added to capture items that do not fit the above categories. This category was created by HMPC members and lists the facilities critical or of particular importance/value to them. Examples for each of the categories are provided below.

1.) Essential Facilities

Hospitals and other medical facilities
Police stations
Fire stations
Emergency Operations Centers

2.) High Potential Loss Facilities

Power plants
Dams and levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

3.) Transportation and Lifelines

Highways, bridges, and tunnels
Railroads and facilities
Airports
Water treatment facilities
Natural gas and oil facilities and pipelines
Communications facilities

Other Assets

Government Office Buildings

- Criminal Justice Center
- Municipal Building
- Army Reserve
- National Guard
- PSB
- Courthouse
- Jail

Utilities

- Public Service—63rd
- Longmont Gas and Electric
- Boulder Hydros

Media

- Daily Camera
- AT&T Cable
- Channel 8

Emergency Services

- PSB
- CJC
- PS&J (Longmont)
- Pridemark
- Boulder County Paramedics

Institutions

- NIST
- NOAA
- NCAR
- CU
- Fairview
- Boulder High
- Monarch
- Nederland
- Skyline
- FAA

Recreation

- Folsom Field
- Macky
- USFS Campgrounds
- Colony Theatre

Transportation

- U.S. 36
- RTD

- Longmont Airport

- Boulder Airport

Water

- Gross Dam
- Barker Dam
- Boulder Water Shed
- Button Rock Dam
- Betasso Water Treatment
- 63rd Street Water Treatment
- Longmont Treatment
- Nederland Treatment
- Lyons Treatment
- Superior Treatment
- Lafayette Treatment
- Louisville Treatment

Health

- Avista
- Boulder Community Health System
- Good Samaritan Hospital
- Longmont United Hospital
- Centennial Peaks
- Wardenburg Health Center
- Clinica Medical Center
- Boulder Women's Clinic
- Foothills Medical Center

Miscellaneous Events

- Bolder Boulder
- Boulder County Fair

Commercial/Industrial

- IBM
- Hauser
- Amgen
- Lexmark
- StorageTek
- Roche
- Twin Peaks

Boulder County and certain municipalities have GIS databases of critical facilities and infrastructure. The data layer themes and their source are noted in Table 5 below. The best available data was used, but some limitations include lack of complete or comprehensive data and values such as replacement costs. Some data layers were supplemented by HAZUS-MH critical facility layers, such as natural gas facilities, communications facilities, and fire stations, and are noted below. These databases were used in vulnerability assessments for hazards such as wildfire and flood, and are represented in maps and tables in the vulnerability by hazard section that follows.

Table 4.17 Summary of Critical Facilities in GIS

Critical Facilities	Facility Count	Source
Airports	4	Boulder County
Bridges	266	National Bridge Inventory
City Government Buildings	13	Boulder County
Communications	29	Boulder County
County Government Buildings	46	Boulder County
Dams	89	National Inventory of Dams
Daycares	500	Boulder County, Public Health
Elderly Facilities	38	Colorado Department of Public Health and Environment (CDPHE)
Fire Stations	82	Boulder County Fire Districts
Health Care	18	Colorado Department of Public Health and Environment (CDPHE)
Hospitals	6	Colorado Department of Public Health and Environment (CDPHE)
Power Plant - Natural Gas	2	Boulder County
Power Plant - Coal	1	Boulder County
Power Plant - Hydroelectric	5	Boulder County
Police Stations	14	Boulder Regional Emergency Telephone Service Authority (BRETSA)
Schools	144	St Vrain Valley School District, Boulder Valley School District
Red Cross Shelters	44	Red Cross
Waste Water Treatment	37	Denver Regional Council of Governments (DRCOG)
Water Storage Tank	4	City of Longmont

*Shelters can include other facilities such as schools

Natural, Historic, and Cultural Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

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

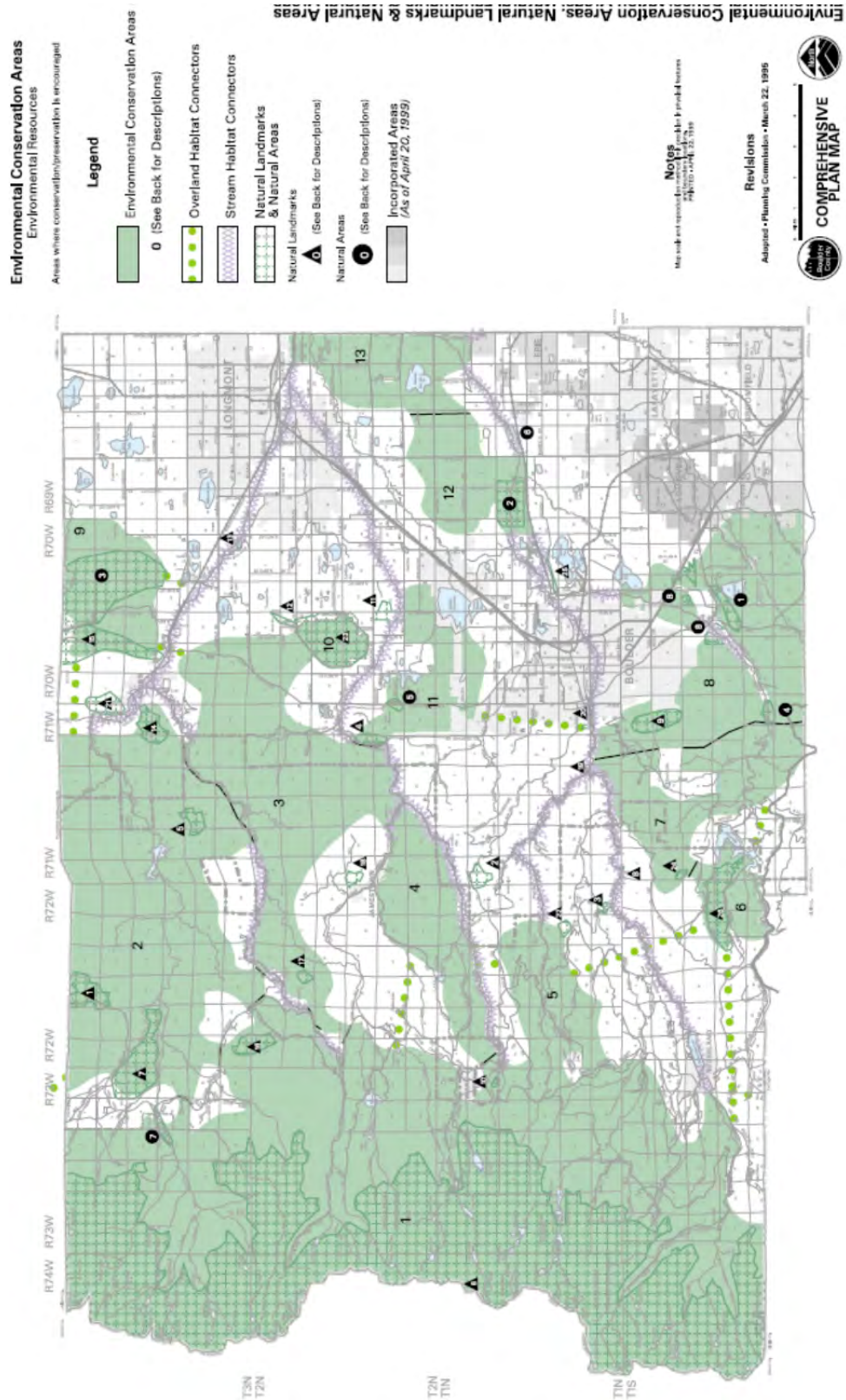
Boulder County contains a unique combination of prairie, forest and tundra environments. The County recognizes three types of valuable natural resources worthy of protection: environmental conservation areas, natural landmarks, and natural areas. These areas are described below and mapped in Figure 6.

Environmental conservation areas are so designated because of the value they provide in the perpetuation of those species, biological communities, and ecological processes that function over large geographic areas and require a high degree of naturalness.

Natural landmarks are defined as prominent landscape features that distinguish a specific locality in Boulder County and are important because of the views they afford, their value as scenic vistas and backdrops, and the intrinsic value they hold as wildlife or plant habitats, natural areas, park and open space preserves, and open land areas.

Natural areas are physical or biological areas that either retain or have reestablished their natural characters, although they need not be completely undisturbed, and that typify native vegetation and associated biological and geological features or provide habitat for rare or endangered animal or plant species or include geologic or other natural features of scientific or educational value.

Figure 4.11. Boulder County Environmental Conservation Areas, Natural Landmarks, and Natural Areas



Environmental Conservation Areas

- 1 Indian Peaks
Size - 1,000,000 Acres
Lifezones - Montane/Subalpine/Alpine
- 2 North St. Vrain
Size - 34,500 Acres
Lifezones - Montane/Foothills
- 3 South St. Vrain/Foothills
Size - 21,800 Acres
Lifezones - Montane/Foothills
- 4 Walker Mountain
Size - 7,500 Acres
Lifezones - Montane
- 5 Fourmile Creek/Bald Mountain
Size - 6,700 Acres
Lifezones - Montane
- 6 Winger Ridge
Size - 3,000 Acres
Lifezones - Montane
- 7 Hawkln Gulch/Walker Ranch/
Upper Eldorado Canyon
Size - 9,500 Acres
Lifezones - Foothills/Plains
- 8 Boulder Mountain Park/South Boulder
Size - 17,500 Acres
Lifezones - Foothills/Plains
- 9 Rabbit Mountain
Size - 7,500 Acres
Lifezones - Foothills/Plains
- 10 Table Mountain
Size - 7,500 Acres
Lifezones - Plains
- 11 Boulder Valley Ranch/ Beach Open Space
Size - 5,500 Acres
Lifezones - Plains
- 12 White Rocks/Gunbarrel Hill
Size - 6,200 Acres
Lifezones - Plains
- 13 East County
Size - 7,300 Acres
Lifezones - Plains

Natural Landmarks

- 1 Big Elk Park
- 2 Bighorn Mountain
- 3 Boulder Falls
- 4 Buckingham Park Hogback
- 5 Coffintop Mountain
- 6 Continental Divide
- 7 Deer Ridge
- 8 Eagle Rock
- 9 Flatirons
- 10 Grassy Top Mountain
- 11 Haystack Mountain
- 12 Hygiene Hogback
- 13 Hygiene Plains Cottonwood
- 14 Indian Lookout Mountain
- 15 Indian Mountain
- 16 Ironclads
- 17 Miller Rock
- 18 Porphyry Mountain
- 19 Profile Rock
- 20 Red Rocks
- 21 Steamboat Mountain
- 22 Sugarloaf Mountain
- 23 Table Mountain
- 24 Twin Sisters Peak
- 25 Valmont Dike
- 26 Winger Ridge

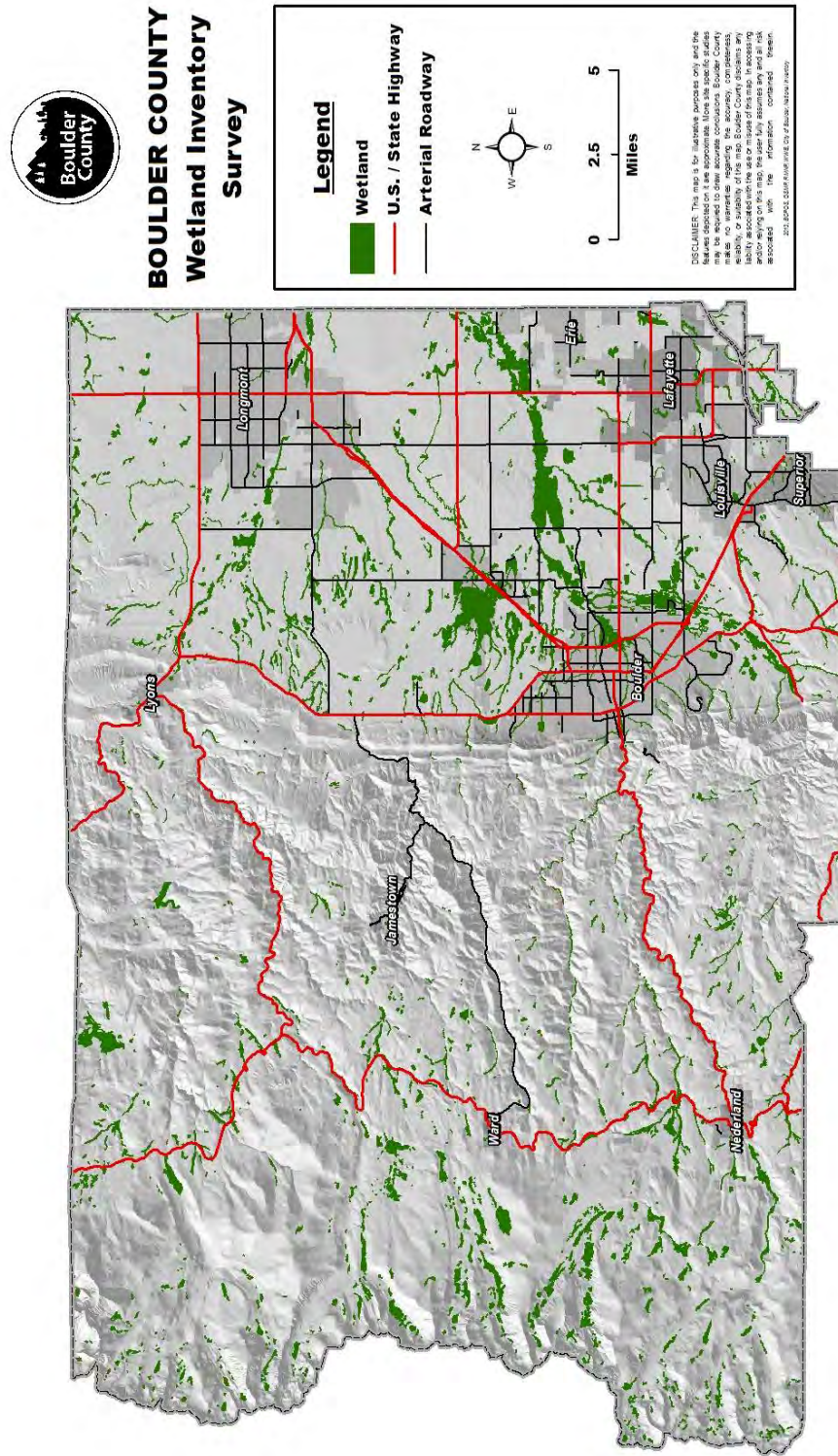
Natural Areas

- 1 Marshall Mesa
- 2 White Rocks
- 3 Rabbit Mountain
- 4 Eldorado Springs Canyon
- 5 Sixmile Fold
- 6 Heron Rookery
- 7 Copeland Willow Carr
- 8 Tallgrass Prairie

Wetlands

Wetlands are a valuable natural resource for communities, due to their benefits to water quality, wildlife protection, recreation, and education, and play an important role in hazard mitigation. Wetlands reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water. They also provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation are vital. Figure 7 illustrates the location of wetland areas in Boulder County.

Figure 4.12. Boulder County Wetland Inventory Survey



Endangered Species and Imperiled Natural Plant Communities

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

According to the U.S. Fish and Wildlife Service, as of September 2013, there were 15 federal endangered, threatened, or candidate species in Boulder County. These species are listed in Table 4.18 along with state listed species (excluding those identified in the County as extirpated or casual/accidental). State special concern is not a statutory category, but suggests a species may be in danger.

Table 4.18. Select List of Important Species Found in Boulder County

COMMON NAME	SCIENTIFIC NAME	TYPE OF SPECIES	STATUS
(A miner bee)	<i>Macrotera opuntiae</i>	Insect	Boulder County Special Concern
American Badger	<i>Taxidea taxus</i>	Mammal	Boulder County Special Concern
American Bittern	<i>Botaurus lentiginosus</i>	Bird	Federal Concern, Sensitive & Boulder County Special Concern
Arogos Skipper	<i>Atrytone arogos</i>	Insect	Boulder County Special Concern
Big Brown Bat	<i>Eptesicus fuscus</i>	Mammal	Boulder County Special Concern
Black Swift	<i>Cypseloides niger</i>	Bird	Federal Sensitive & Boulder County Special Concern
Blue-Ringed Dancer	<i>Argia sedula</i>	Insect	Boulder County Special Concern
Boreal Owl	<i>Aegolius funereus</i>	Bird	Federal Sensitive & Boulder County Special Concern
Brazilian Free-tailed Bat	<i>Tadarida brasiliensis</i>	Mammal	Boulder County Special Concern
Brewer's Sparrow	<i>Spizella breweri</i>	Bird	Federal Concern, Sensitive & Boulder County Special Concern

Brown-capped Rosy-Finch	<i>Leucosticte australis</i>	Bird	Boulder County Special Concern
Cassin's Sparrow	<i>Peucaea cassinii</i>	Bird	Federal Sensitive & Boulder County Special Concern
Chorus Frog	<i>Pseudacris triseriata</i>	Amphibian	Boulder County Special Concern
Colorado Blue	<i>Euphilotes rita</i>	Insect	Boulder County Special Concern
Flammulated Owl	<i>Otus flammeolus</i>	Bird	Federal Sensitive & Boulder County Special Concern
Fringed Myotis	<i>Myotis thysanodes</i>	Mammal	Federal Sensitive & Boulder County Special Concern
Golden Eagle	<i>Aquila chrysaetos</i>	Bird	Federal Concern & Boulder County Special Concern
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Bird	Federal Concern & Boulder County Special Concern
Great Egret	<i>Ardea alba</i>	Bird	Boulder County Special Concern
Hops Feeding Azure	<i>Celastrina humulus</i>	Insect	Boulder County Special Concern
Hudsonian Emerald Dragonfly	<i>Somatochlora hudsonica</i>	Insect	Boulder County Special Concern
Lake Darner	<i>Aeshna eremita</i>	Insect	Boulder County Special Concern
Lark Bunting	<i>Calamospiza melanocorys</i>	Bird	Boulder County Special Concern
Least Bittern	<i>Ixobrychus exilis</i>	Bird	Boulder County Special Concern
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Bird	Federal Concern, Sensitive & Boulder County Special Concern
Little Brown Myotis	<i>Myotis lucifugas</i>	Mammal	Boulder County Special Concern
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Bird	Boulder County Special Concern
Mottled Duskywing	<i>Erynnis martialis</i>	Insect	Boulder County Special Concern
North American Porcupine	<i>Erethizon dorsatum</i>	Mammal	Boulder County Special Concern
Northern Goshawk	<i>Accipiter gentilis</i>	Bird	Federal Sensitive & Boulder County Special Concern
Northern Harrier	<i>Circus cyaneus</i>	Bird	Federal Sensitive & Boulder County Special

			Concern
Ottoe Skipper	<i>Hesperia ottoe</i>	Insect	Federal Sensitive & Boulder County Special Concern
Plains Spadefoot Toad	<i>Spea bombifrons</i>	Amphibian	Boulder County Special Concern
Plains Topminnow	<i>Fundulus sciadicus</i>	Fish	Federal Endangered Review & Boulder County Special Concern
Prairie Falcon	<i>Falco mexicanus</i>	Bird	Federal Concern & Boulder County Special Concern
Prairie Tiger Beetle	<i>Cicindela nebraskana</i>	Insect	Boulder County Special Concern
Regal Fritillary	<i>Speyeria idalia</i>	Insect	Federal Sensitive & Boulder County Special Concern
Rhesus Skipper	<i>Polites rhesus</i>	Insect	Boulder County Special Concern
Rocky Mountain Arctic Jutta	<i>Oeneis jutta</i>	Insect	Boulder County Special Concern
Rocky Mountain Bighorn Sheep	<i>Ovis canadensis</i>	Mammal	Federal Sensitive & Boulder County Special Concern
Short-eared Owl	<i>Asio flammeus</i>	Bird	Federal Sensitive & Boulder County Special Concern
Tiger Salamander	<i>Ambystoma tigrinum</i>	Amphibian	Boulder County Special Concern
Tricolored Bat	<i>Perimyotis subflavus</i>	Mammal	Boulder County Special Concern
Two-spotted Skipper	<i>Euphyes bimacula</i>	Insect	Boulder County Special Concern
Veery	<i>Catharus fuscescens</i>	Bird	Federal Sensitive & Boulder County Special Concern
Western Bumble Bee	<i>Bombus occidentalis</i>	Insect	Boulder County Special Concern
White-tailed Jackrabbit	<i>Lepus townsendii</i>	Mammal	Boulder County Special Concern
White-tailed Ptarmigan	<i>Lagopus leucura</i>	Mammal	Federal Sensitive & Boulder County Special Concern
White-winged Crossbill	<i>Loxia leucoptera</i>	Bird	Boulder County Special Concern
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	Bird	State Special Concern
Arkansas Darter	<i>Etheostoma cragini</i>	Fish	State Threatened

Bald Eagle	<i>Haliaeetus leucocephalus</i>	Bird	State Special Concern
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Mammal	State Special Concern
Bonytail	<i>Gila elegans</i>	Fish	Federal & State Endangered
Botta's Pocket Gopher (rubidus ssp)	<i>Thomomys bottae rubidus</i>	Mammal	State Special Concern
Brassy Minnow	<i>Hybognathus hankinsoni</i>	Fish	State Threatened
Burrowing Owl	<i>Athene cunicularia</i>	Bird	State Threatened
Canada Lynx	<i>Lynx canadensis</i>	Mammal	Federal Threatened & State Endangered
Colorado Butterfly plant	<i>Gaura neomexicana</i> var. <i>coloradensis</i>	Flowering Plants	Federal Threatened
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Fish	Federal Endangered & State Threatened
Common Garter Snake	<i>Thamnophis sirtalis</i>	Reptile	State Special Concern
Common Shiner	<i>Luxilus cornutus</i>	Fish	State Threatened
Couch's Spadefoot	<i>Scaphiopus couchii</i>	Amphibian	State Special Concern
Cylindrical Papershell	<i>Anodontoides ferussacianus</i>	Mollusk	State Special Concern
Ferruginous Hawk	<i>Buteo regalis</i>	Bird	State Special Concern
Flathead Chub	<i>Platygobio gracilis</i>	Fish	State Special Concern
Greater Sandhill Crane	<i>Grus canadensis tabida</i>	Bird	State Special Concern
Humpback Chub	<i>Gila cypha</i>	Fish	Federal Endangered & State Threatened
Iowa Darter	<i>Etheostoma exile</i>	Fish	State Special Concern
Lake Chub	<i>Couesius plumbeus</i>	Fish	State Endangered
Least Tern	<i>Sterna antillarum</i>	Bird	Federal & State Endangered
Long-Billed Curlew	<i>Numenius americanus</i>	Bird	State Special Concern
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Bird	Federal & State Threatened
Northern Cricket Frog	<i>Acris crepitans</i>	Amphibian	State Special Concern
Northern Leopard Frog	<i>Rana pipiens</i>	Amphibian	State Special Concern
Nothorn Redbelly Dace	<i>Phoxinus eos</i>	Fish	State Endangered
Plains Minnow	<i>Hybognathus placitus</i>	Fish	State Endangered
Plains Orangethroat Darter	<i>Etheostoma spectabile</i>	Fish	State Special Concern
Preble's Meadow Jumping Mouse	<i>Zapus hudsonius preblei</i>	Mammal	Federal & State Threatened
Razorback Sucker	<i>Xyrauchen texanus</i>	Fish	Federal & State Endangered
Rio Grande Chub	<i>Gila pandora</i>	Fish	State Special Concern
Rio Grande Sucker	<i>Catostomus plebeius</i>	Fish	State Endangered
River Otter	<i>Lontra canadensis</i>	Mammal	State Threatened
Rocky Mountain Capshell	<i>Acroloxus coloradensis</i>	Mollusk	State Special Concern
Roundtail Horned Lizard	<i>Phrynosoma modestum</i>	Reptile	State Special Concern

Southern Redbelly Dace	<i>Phoxinus erythrogaster</i>	Fish	State Endangered
Stonecat	<i>Noturus flavus</i>	Fish	State Special Concern
Suckermouth Minnow	<i>Phenacobius mirabilis</i>	Fish	State Endangered
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	Reptile	State Special Concern
Townsend's Big-eared Bat	<i>Corynorhinus townsendii pallescens</i>	Mammal	State Special Concern
Ute Ladies'-tresses	<i>Spiranthes diluvialis</i>	Flowering Plants	Federal Threatened
Wolverine	<i>Gulo gulo</i>	Mammal	State Endangered
Wood Frog	<i>Rana sylvatica</i>	Amphibian	State Special Concern

Source: Endangered, Threatened, Proposed, and Candidate Species Colorado Counties (August 2013), U.S. Fish and Wildlife Service Mountain-Prairie Region, www.fws.gov/mountain-prairie/endspp/; Species of Concern, Colorado Parks and Wildlife, <http://ndis.nrel.colostate.edu/>

According to the Colorado Natural Heritage Program, there are a number of natural plant communities in Boulder County that have been identified as critically imperiled, imperiled, or rare/uncommon. These communities are listed in Table 4.19. Some of these communities, as well as critical wildlife habitat that support the species listed in Table 4.18 above are mapped in Figure 4.11.

Table 4.19. Imperiled Natural Plant Communities in Boulder County

State Common Name	State Scientific Name	State Rank
GYMNOSPERMS		
bristlecone pine	<i>Pinus aristata</i>	Unranked
limber pine	<i>Pinus flexilis</i>	Unknown
FERNS & FERN ALLIES		
Fendler's false cloak-fern	<i>Argyrochosma fendleri</i>	Rare or Uncommon
black spleenwort	<i>Asplenium adiantum-nigrum</i> (A. <i>andrewsii</i>)	Critically Imperiled
prairie moonwort	<i>Botrychium campestre</i>	Critically Imperiled
reflected moonwort	<i>Botrychium echo</i>	Rare or Uncommon
forkleaved moonwort	<i>Botrychium furcatum</i>	Critically Imperiled/Imperiled
redbank moonwort	<i>Botrychium furculatum</i>	Rare or Uncommon
western moonwort	<i>Botrychium hesperium</i>	Imperiled
lanceleaf moonwort	<i>Botrychium lanceolatum</i> var. <i>lanceolatum</i>	Rare or Uncommon
narrowleaf moonwort	<i>Botrychium lineare</i>	Critically Imperiled
common moonwort	<i>Botrychium neolunaria</i>	Rare or Uncommon
Mingan moonwort	<i>Botrychium minganense</i>	Imperiled
pale moonwort	<i>Botrychium pallidum</i>	Imperiled
northern moonwort	<i>Botrychium pinnatum</i>	Critically Imperiled
least moonwort	<i>Botrychium simplex</i>	Imperiled

rattlesnake fern	<i>Botrychium virginianum</i> (<i>Botrypus virginianus</i> ssp. <i>europaeus</i>)	Critically Imperiled
spreading woodfern	<i>Dryopteris expansa</i>	Critically Imperiled
variegated scouringrush	<i>Equisetum variegatum</i> (<i>Hippochaete variegata</i>)	Critically Imperiled
western oakfern	<i>Gymnocarpium dryopteris</i>	Imperiled/Rare or Uncommon
western quillwort	<i>Isoetes occidentalis</i>	Critically Imperiled/Imperiled
spiny-spore quillwort	<i>Isoetes tenella</i> (<i>I. echinospora</i>)	Imperiled
Wright's cliffbrake	<i>Pellaea wrightiana</i>	Imperiled
Rocky Mountain polypody	<i>Polypodium saximontanum</i>	Imperiled
Weatherby's Spike-moss	<i>Selaginella weatherbiana</i>	Rare or Uncommon/Apparently Secure
NONVASCULAR		
anacolia moss	<i>Anacolia laevisphaera</i>	Critically Imperiled/Rare or Uncommon
Menzies' anacolia moss	<i>Anacolia menziesii</i>	Critically Imperiled/Rare or Uncommon
andreaea moss	<i>Andreaea rupestris</i>	Critically Imperiled/Rare or Uncommon
	<i>Anoetangium hallii</i>	Unknown
aulacomnium moss	<i>Aulacomnium palustre</i> var. <i>imbricatum</i>	Critically Imperiled/Rare or Uncommon
brachythecium moss	<i>Brachythecium hyalotapetum</i>	Unknown
bryoerythrophyllum moss	<i>Bryoerythrophyllum</i> <i>ferruginascens</i>	Critically Imperiled/Rare or Uncommon
alpine bryum moss	<i>Bryum alpinum</i> (<i>Imbribryum</i> <i>alpinum</i>)	Critically Imperiled/Rare or Uncommon
Schimper's campylopus moss	<i>Campylopus schimperi</i>	Critically Imperiled/Rare or Uncommon
	<i>Didymodon anserinocapitatus</i>	Critically Imperiled
grimmia dry rock moss	<i>Grimmia mollis</i> (<i>Hydrogrimmia</i> <i>mollis</i>)	Critically Imperiled/Rare or Uncommon
grimmia dry rock moss	<i>Grimmia teretinervis</i>	Critically Imperiled/Rare or Uncommon

	<i>Gymnomitrium corallioides</i>	Critically Imperiled/Rare or Uncommon
hylocomiastrum moss	<i>Hylocomiastrum pyrenaicum</i>	Critically Imperiled/Rare or Uncommon
splendid feather moss	<i>Hylocomium alaskanum</i>	Critically Imperiled/Rare or Uncommon
alpine leptopterigynandrum moss	<i>Leptopterigynandrum austro-alpinum</i>	Critically Imperiled/Rare or Uncommon
Blytt's calcareous moss	<i>Mnium blyttii</i>	Critically Imperiled/Rare or Uncommon
	<i>Nardia geoscyphus</i>	Critically Imperiled/Rare or Uncommon
oreas moss	<i>Oreas martiana</i>	Critically Imperiled/Rare or Uncommon
plagiothecium moss	<i>Plagiothecium cavifolium</i>	Critically Imperiled/Rare or Uncommon
Schreber's big red stem moss, feathermoss	<i>Pleurozium schreberi</i>	Critically Imperiled/Rare or Uncommon
Tundra pohlia moss	<i>Pohlia tundrae</i>	Critically Imperiled/Rare or Uncommon
knights plume moss	<i>Ptilium crista-castrensis</i>	Critically Imperiled/Rare or Uncommon
robust rhytidiopsis moss	<i>Rhytidiopsis robusta</i>	Unknown
rough goose neck moss	<i>Rhytidiadelphus triquetrus</i>	Unknown
Roell's moss	<i>Roellia roellii</i>	Critically Imperiled/Rare or Uncommon
sphagnum	<i>Sphagnum angustifolium</i>	Imperiled
contorted sphagnum	<i>Sphagnum contortum</i>	Critically Imperiled/Rare or Uncommon
MONOCOTS		
forked threeawn	<i>Aristida basiramea</i>	Critically Imperiled
fairy slipper orchid	<i>Calypso bulbosa</i>	Unknown
capitate sedge	<i>Carex capitata</i> ssp. <i>arctogena</i>	Critically Imperiled
openfield sedge	<i>Carex conoidea</i>	Critically Imperiled

Crawe's sedge	<i>Carex crawei</i>	Critically Imperiled
lesser panicled sedge	<i>Carex diandra</i>	Critically Imperiled
whollyfruit sedge	<i>Carex lasiocarpa</i>	Critically Imperiled
mud sedge	<i>Carex limosa</i>	Imperiled
livid sedge	<i>Carex livida</i>	Critically Imperiled
Sartwell's sedge	<i>Carex sartwellii</i>	Critically Imperiled
Rocky Mountain sedge	<i>Carex saximontana</i>	Critically Imperiled
Sprengel's sedge	<i>Carex sprengelii</i>	Imperiled
Torrey sedge	<i>Carex torreyi</i>	Critically Imperiled
lesser yellow lady's slipper	<i>Cypripedium parviflorum</i> (C. calceolus ssp. parviflorum)	Imperiled
clustered lady's slipper	<i>Cypripedium fasciculatum</i>	Rare or Uncommon/Apparently Secure
greater yellow lady's slipper	<i>Cypripedium parviflorum</i> var. pubescens	Imperiled
Pacific panicgrass	<i>Dichanthelium acuminatum</i> var. sericeum	Critically Imperiled
slender cottongrass	<i>Eriophorum gracile</i>	Critically Imperiled
twoflowered rush	<i>Juncus biglumis</i>	Rare or Uncommon
smallhead rush	<i>Juncus brachycephalus</i>	Critically Imperiled
Tweedy's rush	<i>Juncus tweedyi</i> (J. brevicaudatus)	Critically Imperiled
Vasey's rush	<i>Juncus vaseyi</i>	Critically Imperiled
simple bog sedge	<i>Kobresia simpliciuscula</i>	Imperiled
wood lily	<i>Lilium philadelphicum</i>	Rare or Uncommon/Apparently Secure
northern twayblade	<i>Listera borealis</i>	Imperiled
broadlipped twayblade	<i>Listera convallarioides</i>	Imperiled
Colorado wood-rush	<i>Luzula subcapitata</i>	Rare or Uncommon
white adder's-mouth orchid	<i>Malaxis brachypoda</i> (M. monophyllos ssp. brachypoda)	Critically Imperiled
icegrass	<i>Phippsia algida</i>	Imperiled
whitestem pondweed	<i>Potamogeton praelongus</i>	Unranked
spiral ditchgrass	<i>Ruppia cirrhosa</i>	Unranked
false melic, purple oat	<i>Schizachne purpurascens</i>	Unranked
pale blue-eyed grass	<i>Sisyrinchium pallidum</i>	Imperiled
Blue Ridge carrionflower	<i>Smilax lasioneura</i>	Rare or Uncommon/Apparently Secure
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	Imperiled
DICOTS		
Colorado aletes	<i>Aletes humilis</i>	Imperiled/Rare or Uncommon
dwarf leadplant	<i>Amorpha nana</i>	Critically

		Imperiled/Imperiled
American groundnut	<i>Apios americana</i>	Critically Imperiled
Rocky Mountain blue columbine	<i>Aquilegia saximontana</i>	Rare or Uncommon
Patterson's wormwood	<i>Artemisia pattersonii</i>	Critically Imperiled/Imperiled
Mountain sagebrush	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> (<i>Seriphidium vaseyanum</i>)	Unranked
narrow-leaved milkweed	<i>Asclepias stenophylla</i>	Imperiled
Front Range milkvetch	<i>Astragalus sparsiflorus</i>	Rare or Uncommon
shortflower Indian paintbrush, downy indian-paintbrush	<i>Castilleja puberula</i>	Imperiled/Rare or Uncommon
fireberry, yellow hawthorn	<i>Crataegus chrysocarpa</i>	Critically Imperiled
thickleaf draba	<i>Draba crassa</i>	Rare or Uncommon
clawless draba	<i>Draba exungiculata</i>	Imperiled
Austrian draba, arctic draba	<i>Draba fladnizensis</i>	Imperiled/Rare or Uncommon
Gray's draba	<i>Draba grayana</i>	Imperiled
Porsild's draba	<i>Draba porsildii</i>	Critically Imperiled
alpine tundra draba	<i>Draba streptobrachia</i>	Rare or Uncommon
pinewoods drymary, spreading drymaria	<i>Drymaria effusa</i> var. <i>depressa</i>	Critically Imperiled
showy prairie gentian	<i>Eustoma exaltatum</i> ssp. <i>russellianum</i> (<i>Eustoma grandiflorum</i>)	Rare or Uncommon/Apparently Secure
Colorado butterfly plant	<i>Gaura neomexicana</i> ssp. <i>coloradensis</i>	Critically Imperiled
Rocky Mountain blazing star, gay-feather	<i>Liatris ligulistylis</i>	Critically Imperiled
Colorado tansyaster	<i>Machaeranthera coloradoensis</i>	Rare or Uncommon
leechleaf blazingstar, wavy-leaf stickleaf	<i>Mentzelia sinuata</i> (<i>Nuttallia sinuata</i>), (<i>Nuttallia multiflora</i>)	Rare or Uncommon
Rocky Mountain monkeyflower, budding monkeyflower	<i>Mimulus gemmiparus</i>	Critically Imperiled
weak groundsel	<i>Packera debilis</i>	Critically Imperiled
rooted poppy, alpine poppy	<i>Papaver radicum</i> ssp. <i>kluanense</i> (<i>P. kluanense</i> , <i>P. lapponicum</i> ssp. <i>occidentale</i>)	Rare or Uncommon/Apparently Secure
Kotzebue's grass of parnassus	<i>Parnassia kotzebuei</i>	Imperiled
mountain ball cactus	<i>Pediocactus simpsonii</i>	Unknown
Harbour's beardtongue	<i>Penstemon harbourii</i>	Rare or Uncommon/Apparently Secure
Rocky Moutain phacelia	<i>Phacelia denticulata</i>	Unranked
Bell's twinpod	<i>Physaria bellii</i>	Imperiled/Rare or Uncommon

twinpod hybrid	<i>Physaria bellii x vitulifera</i>	Critically Imperiled
silkyleaf cinquefoil	<i>Potentilla ambigens</i>	Critically Imperiled/Imperiled
rock cinquefoil	<i>Potentilla rupincola (P. effusa var. rupincola)</i>	Imperiled
whiteveined wintergreen, pictureleaf wintergreen	<i>Pyrola picta</i>	Rare or Uncommon/Apparently Secure
ice cold buttercup, tundra buttercup	<i>Ranunculus gelidus ssp. grayi (R. karelinii)</i>	Imperiled
sageleaf willow	<i>Salix candida</i>	Imperiled
autumn willow	<i>Salix serissima</i>	Critically Imperiled
James' telesonix	<i>Telesonix jamesii</i>	Imperiled
arrow thelypody	<i>Thelypodium sagittatum</i>	Critically Imperiled
Lyll's goldenweed	<i>Tonestus lyallii</i>	Critically Imperiled
lesser bladderwort	<i>Utricularia minor</i>	Imperiled
yellowishwhite bladderwort	<i>Utricularia ochroleuca</i>	Critically Imperiled
prairie violet	<i>Viola pedatifida</i>	Critically Imperiled
Selkirk's violet	<i>Viola selkirkii</i>	Critically Imperiled
SIGNIFICANT NATURAL COMMUNITIES		
Subalpine Forest	<i>Abies lasiocarpa</i> Moss Forest	Imperiled
Western Slope Grassland	<i>Achnatherum hymenoides</i> Shale Barren Herbaceous Vegetation	Imperiled
Montane Riparian Shrubland	<i>Alnus incana / Equisetum arvense</i> Shrubland	Rare or Uncommon
Thinleaf Alder/Mesic Forb Riparian Shrubland	<i>Alnus incana /</i> Mesic Forbs Shrubland	Rare or Uncommon
Montane Riparian Shrubland	<i>Alnus incana /</i> Mesic Graminoids	Rare or Uncommon
Thinleaf Alder-Mixed Willow Species	<i>Alnus incana - Salix (monticola, lucida, ligulifolia)</i> Shrubland	Rare or Uncommon
Montane Riparian Shrubland	<i>Alnus incana - Salix drummondiana</i> Shrubland	Rare or Uncommon
Xeric Tallgrass Prairie	<i>Andropogon gerardii - Schizachyrium scoparium</i> Western Great Plains Herbaceous Vegetation	Imperiled
Mesic Tallgrass Prairie, Forest Openings	<i>Andropogon gerardii - Sorghastrum nutans</i> Western Great Plains Herbaceous Vegetation	Critically Imperiled/Imperiled
Xeric Tallgrass Prairie, Forest Openings	<i>Andropogon gerardii - Sporobolus heterolepis</i> Western Foothills Herbaceous Vegetation	Critically Imperiled/Imperiled
Foothills Riparian Shrubland	<i>Betula occidentalis / Maianthemum stellatum</i>	Imperiled

	Shrubland	
Lower Montane Riparian Shrubland	<i>Betula occidentalis</i> / Mesic Graminoids Shrubland	Imperiled
Shortgrass Prairie	<i>Bouteloua gracilis</i> - <i>Buchloe dactyloides</i> Herbaceous Vegetation	Imperiled
Shortgrass Prairie	<i>Bouteloua gracilis</i> - <i>Bouteloua hirsuta</i> Herbaceous Vegetation	Unrankable
Slimstem Reedgrass	<i>Calamagrostis stricta</i> Herbaceous Vegetation [Provisional]	Critically Imperiled
	<i>Caltha leptosepala</i> / <i>Deschampsia cespitosa</i> Herbaceous Vegetation	Rare or Uncommon
	<i>Caltha leptosepala</i> / <i>Polygonum bistortoides</i> Herbaceous Vegetation	Unknown
Montane Fen	<i>Carex aquatilis</i> / <i>Sphagnum</i> spp.	Imperiled
Quaking Fen	<i>Carex diandra</i> Wet Meadow Herbaceous Vegetation	Unrankable
Montane Wetland	<i>Carex lasiocarpa</i> Herbaceous Vegetation	Critically Imperiled
Clustered Sedge Wetland	<i>Carex praegracilis</i> Herbaceous Vegetation	Imperiled
Alpine Meadows	<i>Carex rupestris</i> - <i>Trifolium dasyphyllum</i> Herbaceous Vegetation	Rare or Uncommon/Apparently Secure
Wet Meadow	<i>Carex saxatilis</i> Herbaceous Vegetation	Imperiled
Hackberry	<i>Celtis laevigata</i> var. <i>reticulata</i> / <i>Pseudoroegneria spicata</i> Woodland	Critically Imperiled/Imperiled
Foothills Shrubland	<i>Cercocarpus montanus</i> / <i>Achnatherum scribneri</i> Shrubland	Rare or Uncommon
Mixed Foothill Shrublands, Foest Openings	<i>Cercocarpus montanus</i> / <i>Hesperostipa comata</i> Shrubland	Imperiled
Foothills Shrubland	<i>Cercocarpus montanus</i> / <i>Hesperostipa neomexicana</i> Shrubland	Imperiled/Rare or Uncommon
Mountain Mahogany - Skunkbush / Big Bluestem Shrubland	<i>Cercocarpus montanus</i> - <i>Rhus trilobata</i> / <i>Andropogon gerardii</i> Shrubland	Imperiled/Rare or Uncommon
Lower Montane Forests	<i>Corylus cornuta</i> Shrubland [Provisional]	Critically Imperiled

Montane Grasslands, Forest Openings	<i>Danthonia parryi</i> Herbaceous Vegetation	Rare or Uncommon
Tufted Hairgrass - Mountain Timothy	<i>Deschampsia cespitosa</i> - <i>Phleum alpinum</i> Herbaceous Vegetation	Rare or Uncommon
Salt Meadows	<i>Distichlis spicata</i> Herbaceous Vegetation	Rare or Uncommon
Alpine Wetlands	<i>Eleocharis quinqueflora</i> Herbaceous Vegetation	Rare or Uncommon/Apparently Secure
Emergent Wetland	<i>Eleocharis rostellata</i> Herbaceous Vegetation	Imperiled
	<i>Festuca thurberi</i> Subalpine Grassland Herbaceous Vegetation	Rare or Uncommon
Alpine Meadows	<i>Geum rossii</i> - <i>Trifolium</i> ssp. Herbaceous Vegetation	Rare or Uncommon
American Mannagrass Herbaceous Vegetation	<i>Glyceria grandis</i> Herbaceous Vegetation	Imperiled
	<i>Hesperostipa comata</i> - <i>Achnatherum hymenoides</i>	Critically Imperiled
	<i>Hesperostipa comata</i> - <i>Bouteloua gracilis</i> Colorado Front Range Herbaceous Vegetation	Imperiled
Great Plains Mixed Grass Prairie	<i>Hesperostipa comata</i> Colorado Front Range Herbaceous Vegetation	Critically Imperiled/Imperiled
Great Plains Mixed Grass Prairie	<i>Hesperostipa neomexicana</i> Herbaceous Vegetation	Rare or Uncommon
	<i>Juncus parryi</i> / <i>Sibbaldia procumbens</i> Herbaceous Vegetation	Unranked
Dry Alpine Meadows	<i>Kobresia myosuroides</i> - <i>Carex rupestris</i> var. <i>drummondiana</i> Herbaceous Vegetation	Rare or Uncommon
Mountain Muhly Herbaceous Vegetation, Forest Openings	<i>Muhlenbergia montana</i> Herbaceous Vegetation	Imperiled
Montane Grasslands	<i>Muhlenbergia montana</i> - <i>Danthonia parryi</i> Herbaceous Vegetation	Imperiled
Montane Grasslands, Forest Openings	<i>Muhlenbergia montana</i> - <i>Hesperostipa comata</i> Herbaceous Vegetation	Critically Imperiled/Imperiled
Playa Grassland	<i>Pascopyrum smithii</i> - <i>Eleocharis</i> spp. Herbaceous Vegetation	Critically Imperiled
Iron Fen	(<i>Picea engelmannii</i>) / <i>Betula nana</i> / <i>Carex aquatilis</i> -	Imperiled

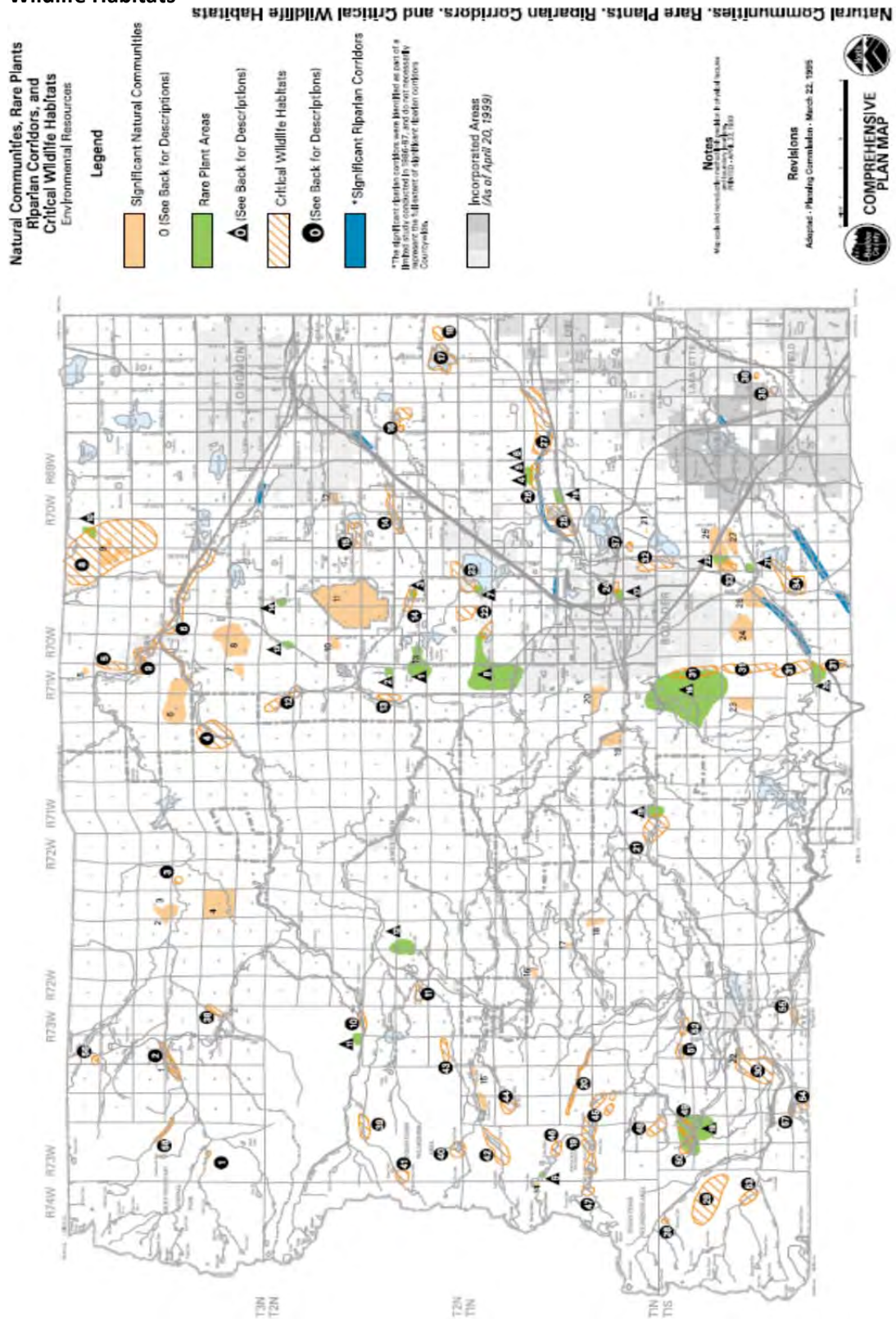
	<i>Sphagnum angustifolium</i> Woodland	
Timberline Forests	<i>Picea engelmannii</i> / <i>Trifolium dasyphyllum</i> Forest	Imperiled
Montane Riparian Forests	<i>Picea pungens</i> / <i>Alnus incana</i> Woodland	Rare or Uncommon
Montane Riparian Woodland	<i>Picea pungens</i> / <i>Betula occidentalis</i> Woodland	Imperiled
Mixed Montane Forest	<i>Picea pungens</i> / <i>Linnaea borealis</i> Forest	Critically Imperiled
Lower Montane Woodlands	<i>Pinus flexilis</i> / <i>Arctostaphylos uva-ursi</i> Woodland	Imperiled
Lower Montane Woodlands	<i>Pinus flexilis</i> / <i>Juniperus communis</i> Woodland	Rare or Uncommon
	<i>Pinus ponderosa</i> / <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> Woodland	Unranked
Foothills Ponderosa Pine Savannas	<i>Pinus ponderosa</i> / <i>Carex inops</i> ssp. <i>heliophila</i> Woodland	Imperiled
Foothills Ponderosa Pine Scrub Woodlands	<i>Pinus ponderosa</i> / <i>Cercocarpus montanus</i> / <i>Andropogon gerardii</i> Wooded Herbaceous Vegetation	Imperiled
Foothills Ponderosa Pine Savannas	<i>Pinus ponderosa</i> / <i>Leucopoa kingii</i> Woodland	Rare or Uncommon
Foothills Ponderosa Pine Savannas	<i>Pinus ponderosa</i> / <i>Muhlenbergia montana</i> Woodland	Imperiled/Rare or Uncommon
Foothills Ponderosa Pine Scrub Woodlands	<i>Pinus ponderosa</i> / <i>Purshia tridentata</i> Woodland	Rare or Uncommon
Ponderosa Pine / Little Bluestem Woodland	<i>Pinus ponderosa</i> / <i>Schizachyrium scoparium</i> Woodland	Critically Imperiled
Montane Riparian Forest	<i>Populus angustifolia</i> / <i>Alnus incana</i> Woodland	Rare or Uncommon
Montane Riparian Forest	<i>Populus angustifolia</i> / <i>Betula occidentalis</i> Woodland	Rare or Uncommon
Foothills Riparian Woodland	<i>Populus angustifolia</i> / <i>Salix irrorata</i> Woodland	Imperiled
Montane Riparian Woodland	<i>Populus balsamifera</i> Woodland	Imperiled
Plains Cottonwood Riparian Woodland	<i>Populus deltoides</i> - (<i>Salix amygdaloides</i>) / <i>Salix</i> (<i>exigua</i> , <i>interior</i>) Woodland	Rare or Uncommon
Montane Riparian Forests	<i>Populus tremuloides</i> / <i>Acer glabrum</i> Forest	Imperiled
Montane Riparian Forests	<i>Populus tremuloides</i> / <i>Alnus</i>	Rare or Uncommon

	<i>incana</i> Forest	
Quaking Aspen / Water Birch Forest, Riparian	<i>Populus tremuloides</i> / <i>Betula occidentalis</i> Forest	Imperiled
Aspen / Blue Joint Reed Grass	<i>Populus tremuloides</i> / <i>Calamagrostis canadensis</i> Forest	Rare or Uncommon
Montane Riparian Forests	<i>Populus tremuloides</i> / <i>Corylus cornuta</i> Forest	Critically Imperiled
Montane Riparian Forests	<i>Populus tremuloides</i> / <i>Lonicera involucrata</i> (L. <i>distigia</i>) Forest	Rare or Uncommon
Montane Riparian Forests	<i>Populus tremuloides</i> / <i>Ribes montigenum</i> Forest	Imperiled
Aspen Forests	<i>Populus tremuloides</i> / <i>Vaccinium myrtillus</i> Forest	Rare or Uncommon
Montane Floating/Submergent Wetland	<i>Potamogeton natans</i> Herbaceous Vegetation	Critically Imperiled
Montane Riparian Forest	<i>Pseudotsuga menziesii</i> / <i>Betula occidentalis</i> Woodland	Rare or Uncommon
Lower Montane Forests	<i>Pseudotsuga menziesii</i> / <i>Paxistima myrsinites</i> Forest	Imperiled/Rare or Uncommon
Mixed Foothill Shrublands	<i>Purshia tridentata</i> / <i>Artemisia frigida</i> / <i>Hesperostipa comata</i> Shrubland	Critically Imperiled/Imperiled
Mixed Foothill Shrublands	<i>Purshia tridentata</i> / <i>Muhlenbergia montana</i> Shrubland	Imperiled
Skunkbrush Riparian Shrubland	<i>Rhus trilobata</i> Intermittently Flooded Shrubland	Imperiled
Arctic Willow - Net-Veined Willow Shrubland	<i>Salix arctica</i> / <i>Salix nivalus</i> Dwarf Shrubland	Imperiled
Montane Willow Carrs	<i>Salix bebbiana</i> Shrubland	Imperiled
Booth Willow / Canadian Reed Grass Shrubland	<i>Salix boothii</i> / <i>Calamagrostis canadensis</i> Shrubland	Imperiled
Booth's Willow / Beaked Sedge	<i>Salix boothii</i> / <i>Carex utriculata</i> Shrubland	Rare or Uncommon
Booth's Willow / Haroglass [sic]	<i>Salix boothii</i> / <i>Deschampsia caespitosa</i> / <i>Geum rossii</i> Shrubland	Rare or Uncommon/Apparently Secure
Booth's Willow Mesic Forb	<i>Salix boothii</i> Mesic Forbs Shrubland	Rare or Uncommon
Riparian Willow Carr	<i>Salix boothii</i> Mesic Graminoids Shrubland	Rare or Uncommon
Subalpine Riparian / Wetland Carr	<i>Salix brachycarpa</i> / <i>Carex aquatilis</i>	Imperiled/Rare or Uncommon
Lower Montane Willow Carrs	<i>Salix drummondiana</i> / <i>Calamagrostis canadensis</i> Shrubland	Rare or Uncommon

Montane Willow Carrs	<i>Salix geyeriana</i> - <i>Salix monticola</i> / <i>Calamagrostis canadensis</i> Shrubland	Rare or Uncommon
Montane Riparian Willow Carr	<i>Salix geyeriana</i> / <i>Calamagrostis canadensis</i> Shrubland	Rare or Uncommon
Montane Willow Carr	<i>Salix geyeriana</i> / <i>Carex aquatilis</i> Shrubland	Rare or Uncommon
Montane Willow Carr	<i>Salix monticola</i> / <i>Calamagrostis canadensis</i> Shrubland	Rare or Uncommon
Montane Riparian Willow Carr	<i>Salix monticola</i> / <i>Carex aquatilis</i> Shrubland	Rare or Uncommon
Montane Riparian Willow Carr	<i>Salix monticola</i> / <i>Carex utriculata</i> Shrubland	Rare or Uncommon
Montane Riparian Willow Carr	<i>Salix monticola</i> / Mesic Graminoids Shrubland	Rare or Uncommon
Subalpine Riparian Willow Carr	<i>Salix planifolia</i> / <i>Deschampsia caespitosa</i> Shrubland	Imperiled/Rare or Uncommon
Subalpine Riparian Willow Carr	<i>Salix wolfii</i> / Mesic Forbs Shrubland	Rare or Uncommon
Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	<i>Schizachyrium scoparium</i> - <i>Bouteloua curtipendula</i> Western Great Plains Herbaceous Vegetation	Imperiled
Prairie Slough Grass	<i>Spartina pectinata</i> Western Herbaceous Vegetation	Rare or Uncommon
Pursh Seepweed	<i>Suaeda calceoliformis</i> Herbaceous Vegetation	Imperiled
Western Snowberry Shrubland	<i>Symphoricarpos occidentalis</i> Shrubland	Rare or Uncommon

Source: Colorado Natural Heritage Program, www.cnhp.colostate.edu/

Natural Communities, Rare Plants, Riparian Corridors, and Critical Wildlife Habitats



Significant Natural Communities	Rare Plant Areas	Critical Wildlife Habitats
1 Montane Willow Carr	1 <i>Physaria belli</i>	1 Ousel Falls
2 Foothills Ponderosa Pine Scrub Woodland (Purshia)	2 <i>Physaria belli</i>	2 Copeland Willow Carr (+ wetlands)
3 Mixed Foothills Shrubland (Purshia)	3 <i>Physaria belli</i>	3 South Sheep Mountain
4 Foothills Ponderosa Pine Savanna	4 <i>Arctostaphylos</i>	4 Deadman Gulch and South St. Vrain
5 Mixed Foothills Shrubland (Cercocarpus)	5 <i>Ajuga americana</i>	4 Steamboat Mountain
6 Xeric Tallgrass Prairie	6 <i>Asplenium adnigrum-nigrum</i>	6 St. Vrain Creek (+ wetlands)
7 Foothills Ponderosa Pine Scrub Woodland (Cercocarpus)	7 <i>Physaria belli</i>	7 St. Vrain Corridor (+ wetlands)
8 Foothills Ponderosa Pine Scrub Woodland (Cercocarpus)	8 <i>Physaria belli</i>	8 Rabbit Mountain
9 Foothills Ponderosa Pine Scrub Woodland (Cercocarpus)	9 <i>Physaria belli</i>	9 Old Apple Valley
10 Great Plains Mixed Grass Prairie (Stipa comata)	10 <i>Physaria belli</i>	10 Middle St. Vrain Willow Carr (+ wetlands)
11 Great Plains Mixed Grass Prairie (Stipa neomexicana)	11 <i>Liatris corniculoides</i>	11 Turnbleson Lake (+ wetlands)
12 Great Plains Salt Meadow	12 <i>Eriogonum grandiflorum</i>	12 Marlette Canyon
13 Great Plains Mixed Grass Prairie (Stipa comata)	13 <i>Physaria belli</i>	13 Lefthand Palisades
14 Alpine Wetlands	14 <i>Physaria belli</i>	14 Lefthand Creek Cottonwood Groves (+ wetlands)
15 Montane Wet Willow Carr	15 <i>Salicoidia weaveriana</i>	15 Lagerman Reservoir (+ wetlands)
16 Montane Grasslands	16 <i>Amygdalus</i>	16 Gaynor Lakes (+ wetlands)
17 Foothills Ponderosa Pine Savanna	17 <i>Penstemon</i>	17 Penstemon Reservoir (+ wetlands)
18 Montane Grasslands	18 <i>Malva fruticulosa</i>	18 B-J Acres Ranch
19 Foothills Ponderosa Pine Savanna	19 <i>Pyrola</i>	19 City of Boulder Watershed (Special Consideration)
20 Xeric Tallgrass Prairie	20 <i>Salicoidia weaveriana</i>	20 Como Creek (Special Consideration)
21 Great Plains Mixed Grass Prairie	21 <i>sensitive species</i>	21 Boulder Falls area
22 Montane Willow Carr	22 <i>Eriogonum grandiflorum</i>	22 Boulder Valley Ranch (+ wetlands)
23 Montane Grasslands	23 <i>Bryophytes</i>	23 Boulder Reservoir (+ wetlands)
24 Wet Prairie	24 <i>Bryophytes</i>	24 Cottonwood Grove on Boulder Creek (+ wetlands)
25 Wet Prairie	25 <i>Liatris corniculoides</i>	25 Walden and Sawhill Ponds (+ wetlands)
26 Wet Prairie	26 <i>Bryophytes</i>	26 White Rocks (+ wetlands)
27 Xeric Tallgrass Prairie	27 <i>Salicoidia weaveriana</i>	27 Cottonwood Grove & Heron Rookery (+ wetlands)
	28 <i>Amygdalus</i>	28 Diamond Lake Outlet
	29 <i>Amygdalus</i>	29 Chittenden Meadows (+ wetlands)
		30 Arapaho Ranch - Tucker Homestead (+ wetlands)
		31 Boulder Mountain Parks - Eldorado Mountain
		32 South Boulder Creek (+ wetlands)
		33 Tallgrass Prairie
		34 Marshall Mesa
		35 Stearns Lake (+ wetlands)
		36 Carolyn Holmberg Preserve at Rock Creek Farm
		37 Sombra Marsh (+ wetlands)
		38 Lazy H Ranch Willow Carr (+ wetlands)
		39 Coney Flats Willow Carr (+ wetlands)
		40 Mitchell Lake Willow Carr (+ wetlands)
		41 Coney Lake Willow Carr (+ wetlands)
		42 Long Lake Willow Carr (+ wetlands)
		43 South St. Vrain Willow Carr (+ wetlands)
		44 Lefthand Reservoir Willow Carr (+ wetlands)
		45 Boulder Watershed Willow Carr (+ wetlands)
		46 Lake Ablon Willow Carr (+ wetlands)
		47 Triple Lakes Willow Carr (+ wetlands)
		48 Horseshoe Creek Willow Carr (+ wetlands)
		49 Caribou Park Willow Carr (+ wetlands)
		50 Upper Caribou Park Willow Carr (+ wetlands)
		51 Deland Creek Willow Carr (+ wetlands)
		52 Caribou Ranch Willow Carr (+ wetlands)
		53 Woodland Flats Willow Carr (+ wetlands)
		54 Buckeye Basin Willow Carr (+ wetlands)
		55 Los Lagos Willow Carr (+ wetlands)
		56 Roaring Fork Willow Carr (+ wetlands)
		57 Peterson Lake (+ wetlands)
		58 Hunter's Creek

Historic and Cultural Resources

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

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

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

Table 4.20. lists the properties and districts in Boulder County that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties. Those properties that are only on the Colorado State Register are indicated with an asterisk. Structures recognized as Boulder County Historic Landmarks are listed in Table 4.13.

Table 4.20. Boulder County Historic Properties/Districts in National and State Registers

Table 4.20. Boulder County Historic Properties/Districts in National and State Registers			
Property	Jurisdiction	Address	Date Listed
Arnett-Fullen House	Boulder	646 Pearl St	1/29/2009
Boulder County Poor Farm	Boulder	Address Restricted	9/13/2001
Boulder Creek Bridge	Boulder	CO 119 at milepost 39.13	3/11/2003
Boulder Downtown Historic District	Boulder	CO 19	12/3/1980
Boulder Post Office	Boulder	1905 15th Street	1/22/1986
Boulder Valley Grange No. 131	Lafayette	3400 N. 95th Street	12/7/1987
Bunce School	Allenspark	CO 7 S. of Allenspark	5/22/1986
Callahan, T. M., House	Longmont	312 Terry Street	5/16/1985
Cardinal Mill	Nederland	167 Bergen	12/22/2011

Carnegie Library	Boulder	1125 Pine Street	2/16/1979
Chautauqua Auditorium	Boulder	Chautauqua Park	1/21/1974
Church of the Brethren	Hygiene	17th Avenue	1/5/1984
Coal Creek Agricultural Site (Grasso Park)*	Superior	122 E. William Street	3/11/1998
Colorado & Northwestern Railroad Engine No. 30*	Boulder	Central Park, south side of Canyon Boulevard between Broadway and 13th Street	9/9/1998
Colorado Chautauqua / Chautauqua Park	Boulder	900 Baseline Road, Chautauqua Park	3/21/1978
Columbia Cemetery	Boulder	Along 9th Street, bounded by Pleasant and College Avenues	8/1/1997
Congregational Church	Lafayette	300 E. Simpson Street	5/20/1983
Denver & Rio Grande Railroad Caboose No. 04990*	Boulder	Central Park, south side of Canyon Boulevard between Broadway and 13th Street	9/9/1998
Denver & Rio Grande Railroad Coach No. 280*	Boulder	Central Park, south side of Canyon Boulevard between Broadway and 13th Street	9/9/1998
Denver Elevator / Grain Elevator	Louisville	Tract 712 near CO 42	2/14/1986
Denver, Boulder & Western Railway / Switzerland Trail of America (at Ward)	Ward	CO 72	9/18/1980
Denver, Northwestern and Pacific Railway Historic District	Eldora/ Rollinsville	Southwest of Eldora/Rollins Pass	9/30/1980
Dickens Opera House	Longmont	300 Main Street	7/28/1987
East Longs Peak Trail (Boulder county trailhead)	Meeker Park	Rocky Mountain National Park, Meeker Park vicinity	7/10/2007
East Side Historic District	Longmont	Bounded by Longs Peak Avenue, Collyer Street, 4th Avenue, and Emery Street	10/2/1986

Eldora Historic District	Eldora	Roughly Eaton Pl., 6th, Pearl, and 4th Sts, Huron Ave, 6th St, Eldorado Ave, and 7th Street, Klondyke Ave, and 10th St	10/4/1989
Empson Cannery	Longmont	15 3rd Avenue	1/5/1984
Ewing Family Farmhouse*	Lafayette	1915 N. 95th Street	12/13/1995
First Baptist Church of Boulder	Boulder	1237 Pine Street	4/14/2004
First Congregational / Old Stone Church	Lyons	High and 4th Streets	12/12/1976
Fox Mine Office	Boulder	1226 S. Cherryvale Road	2/23/1996
Fox Stone Barn	Boulder	S. Cherryvale Road, .5 miles south of U.S. 36	2/16/1996
Ginacci House	Louisville	1116 LaFarge Street	2/14/1986
Gold Hill Historic District	Gold Hill	Roughly bounded by North Street, Pine Street, Boulder Street, Gold Run Street, and College Street	8/3/1989
Gold Miner Hotel	Eldora	601 Klondyke Avenue	7/3/1997
Highland School	Boulder	885 Arapahoe Avenue	12/18/1978
Hotel Boulderado	Boulder	2115 13th Street	11/3/1994
Hoverhome and Hover Farmstead	Longmont	1303-1309 Hover Road	1/15/1999
Jacoe Store	Louisville	1001 Main Street	2/14/1986
Jamestown Mercantile Building	Jamestown	Main Street	8/3/1989
Jamestown Town Hall	Jamestown	118 Main Street	7/10/2003
Kullgren House	Lafayette	209 E. Cleveland Street	5/20/1983
La Salla House / Wilson House	Louisville	1124 Main Street	2/14/1986
Lackner's Tavern	Louisville	1006 Pine	2/14/1986
Lafayette House	Lafayette	600 E. Simpson Street	5/20/1983
Lewis House	Lafayette	108 E. Simpson Street	5/20/1983
Little Church in the Pines	Salina	414 Gold Run Road	8/3/1989
Longmont Carnegie Library	Longmont	457 4th Avenue	11/3/1992
Longmont College (The Landmark)	Longmont	546 Atwood Street	8/12/1987
Longmont Fire Department	Longmont	667 4th Avenue	5/16/1985
Longmont Power Plant	Lyons	Old Apple Valley Road	9/10/1987

Lyons Railroad Depot (Lyons Public Library)	Lyons	400 block of Broadway	12/2/1974
Lyons Sandstone Buildings	Lyons	U.S. 36 and CO 7	4/29/1980
Marshall School*	Marshall	1595 S. Cherryvale Road	5/13/1992
Martha Weiser House	Boulder	4020 N. 75th St	10/16/2013
McKenzie Well	Boulder	Near Independence Road and CO 119	1/26/2005
Meadow Park Shelter House*	Lyons	600 Park Drive	3/10/1993
Miller House	Lafayette	409 E. Cleveland Street	5/20/1983
Modoc Mill	Ward	North of Ward	12/27/1978
Mount St. Gertrude Academy	Boulder	970 Aurora Street	11/3/1994
National Fuel Company Store	Louisville	801 Main Street	2/14/1986
Nelson House*	Boulder	1818 Baseline Road	12/16/2005
Niwot Cemetery*	Niwot	7251 Nimbus Road	5/16/2001
Norlin Quadrangle Historic District	Boulder	University of Colorado campus	3/27/1980
North St. Vrain Creek Bridge	Lyons	CO 7 at milepost 32.98	10/15/2002
Northern Colorado Power Company Substation / U.S. Express Building	Boulder	1590 Broadway	5/22/1986
Petrelli-Del Pizzo House	Louisville	1016 Main Street	2/14/1986
Petrelli--DelPizzo House	Louisville	1016 Main Street	2/14/1986
Rhoades House	Louisville	1024 Grant	2/14/1986
Robinson House	Louisville	301 Spruce	2/14/1986
Rock Creek Site*	Rock Creek near Boulder	West of CO Highway 287 on Rock Creek	3/10/1993
Rocky Mountain Mammoth Mine	Nederland	4879 Magnolia Dr	7/6/2010
Rollinsville and Middle Park Wagon Road - Denver Northwestern & Pacific Railway Hill Route Historic District / Moffat	Eldora	Eldora vicinity, Rollinsville to Winter Park	9/23/1997

Road			
Salina School	Salina	536 Gold Run Road	8/3/1989
Sandbeach Lake Trail	Meeker Park	Rocky Mountain National Park, Meeker Park vicinity	1/29/2008
Shannon Farm	Lafayette	1341 N. 95th Street	10/17/2003
Snowbound Mine	Gold Hill	CO Road 52	8/3/1989
Squires-Tourtellot House / Malick House	Boulder	1019 Spruce Street	8/10/1978
St. Stephen's Episcopal Church	Longmont	470 Main Street	2/24/1975
Stolmes House	Louisville	616 Front Street	2/14/1986
Sunshine School	Sunshine	355 CO Road 83	7/27/1989
Swedish Evangelical Lutheran Church of Ryssby	Boulder	N. 63rd Street	2/16/1984
Tego Brothers Drugstore / State National Bank of Louisville	Louisville	700 Main Street	2/14/1986
Terrace, The	Lafayette	207 E. Cleveland Street	11/3/1987
The Lodge at Los Lagos*	Rollinsville	Rollinsville vicinity	3/12/2003
Thomas House	Louisville	700 Lincoln	2/14/1986
Thomas M. Callahan House	Longmont	312 Terry St	5/16/1985
Thunder Lake Patrol Cabin	Estes Park	Thunder Lake	1/29/1988
Thunder Lake Trail -- Bluebird Lake Trail (trailhead)	Allenspark	Roughly along N. Street Vrain Circle, west of Wild Basin Ranger Station	1/29/2008
Wall Street Assay Office	Wall Street	6352 Four Mile Canyon Dr.	8/3/1989
Ward Congregational Church	Ward	41 Modoc	8/3/1989
Ward School (Ward Town Hall and Post Office)	Ward	66 Columbia	8/3/1989
West Side Historic District	Longmont	Roughly bounded by 5th, Terry, 3rd, and Grant	1/7/1987

Wild Basin House	Estes Park	Wild Basin	1/29/1988
Wild Basin Ranger Station and House	Estes Park	Wild Basin	1/29/1988
Woodward-Baird House / Little Gray House	Boulder	1733 Canyon Boulevard	2/15/1979
*Only on the Colorado State Register of Historic Properties			

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/; National Register Information System, www.nr.nps.gov/

*Only on the Colorado State Register of Historic Properties

Table 4.21. Boulder County Historic Landmarks

Property	Designation Date
Affolter House	10/2/1997
Alex Ryan Cabins and William Gustafson Cabin (aka Kladstrup Family Cabins)	7/9/2009
Allen Farm	4/15/2003
Altona Grange Site	4/13/1999
Altona School	2/12/2013
Amendment to Flagstaff Cultural Landscape District-Chapman Drive	8/6/2013
Aspenola Cabin	3/29/2007
Barber Homestead	8/17/2006
Betasso Homestead	5/27/1999
Blue Jay Mine	8/14/2007
Blue Jay Mine Site	3/11/2004
Boyd and Brown Houses	8/16/2011
Boyle Homestead/Woodley Farm	11/15/2005
Brethren Church & Hygiene Cemetery	9/29/2005
Brodie Quarry Blacksmith Shop and Cistern	1/16/2001

Bryan – Gaines Cabin	4/26/2007
Bunce School	7/21/1994
Camp Frances	1/29/2009
Cardinal Mill	10/16/2001
Carlson Silo	9/16/1999
Chapman Drive – Amendment to the Flagstaff Mountain Cultural Landscape District	1/26/2010
Clark House	5/14/1996
Cobb & Wood Houses	8/31/2006
Columbia Hotel	8/22/1995
Cornell House	10/23/2012
Crowley Lode Cabin	4/28/2011
Cruthers' Homestead	3/29/2007
Dannels Homestead	3/15/2005
Dickens Homestead & Lashley Barn	12/16/1999
Distel Farm	10/23/1997
Dodd Granary	7/13/2004
Dodd Property	8/7/2002
Eldorado Springs Observation Pavilion	6/15/2006
Flagstaff Mountain Cultural Landscape District	9/12/2002
Forbess/Marlatt Farm	2/15/2005
Forrest Jones Cabin	9/16/1999
Geer Homestead	5/27/1999
Gillaspie House	12/17/1998
Gold Hill Cabin, 501 Main	7/20/2010

Gold Miner Hotel	1/28/1997
Gooding School	7/20/2010
Hall Ranch Complex	4/21/1998
Harney/Lastoka Farm	10/16/2001
Hock Farm	11/16/2010
Honeymoon House	1/5/2012
Hornbaker Residence	5/18/2010
Jamestown Town Hall	1/16/2007
Johnson Farm	7/23/2013
Kluck Residence	6/28/2001
Lakeside Service Station	9/21/2004
Larson House	5/14/1996
Little Church in the Pines	3/14/2002
Little Emily Mining Shack	5/31/2001
Lohr-McIntosh Homestead	1/27/1998
Longfellow-Pace Farm	10/21/2003
Ludlow Farm Site (Spurgeon/Gaynor Lake Farm)	6/6/2001
Martindale Granary	7/25/2002
McCaslin Homestead	4/13/1999
McLellan Cabin	4/26/2007
Montgomery Farm	12/16/2003
Moore-Pruden Ranch	5/1/2012
Mountain House	4/14/2011
Nederland Cemetery	8/15/2000

Nederland Old Stone Garage	10/2/1997
Neva Cabin	8/17/2004
Niwot Chemical Firecart	8/31/2006
Old Town Niwot	10/21/1993
Orodell Townsite	7/1/1993
Peek-A-Boo Cabin (Gilfillan/ Gross)	12/16/1999
Penrose Lodge	7/2/2013
Pilot Mine Shafthouse	12/9/1997
Rock Creek Farm Cultural Landscape	6/18/1998
Rockwall Lodge	3/29/2007
Rocky Ledge Cabin	7/19/2005
Rocky Mountain Hydraulic Lab	10/18/2007
Salina Schoolhouse	5/20/1997
Salina Store	9/9/2010
Sandersen House	1/19/1995
Shannon Farm	3/14/2000
Sinn's Western Trail	5/22/2012
Snowbound Mine	11/18/1997
St. Catherine's Chapel	6/17/1999
St. James Chapel	10/17/1996
Stengel/King Farm Site	4/15/2004
Stroh/Dickens Barn	1/27/1998
Sunshine School	1/19/1995
Superior Cemetery	11/21/2002

Swanson Farm	8/27/2002
Throndson Farm	2/15/2005
Tommy Jones Stagestop	12/12/1996
United Methodist Church of Hygiene	3/14/2002
Valmont School	PENDING
Wallstreet Assay Office	12/17/1998
Woods' Cabin	2/21/2006

Source: Boulder County Land Use Department,
www.bouldercounty.org/lu/hpab/county_register.htm

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

Economic Assets

Economic assets at risk may include major employers or primary economic sectors. Take agriculture for example. It's 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 4.22 lists the top employers in Boulder County by number of employees.

Table 4.22. Top Employers in Boulder County

Name	Address	City
10,000+ Employees		
University of CO - Boulder	Boulder	Boulder
5,000-9,999 Employees		
IBM	Diagonal Hwy	Boulder
1,000-4,999 Employees		

University of Boulder	Marine St	Boulder
Boulder Community Hospital	Balsam Ave	Boulder
Boulder Community Hospital	Mapleton Ave	Boulder
Covidien	Gunbarrel Ave	Boulder
Covidien	Longbow Dr	Boulder
Exempla Good Samaritan Med Ctr	Exempla Cir	Lafayette
Seagate Technology	Disc Dr	Longmont
Ibm Business Continuity	Diagonal Hwy	Boulder
Longmont United Hospital	Mountain View Ave	Longmont
Office of Oceanic & Atmospherics	Broadway St	Boulder
500-999 Employees		
Digital Globe Inc	Dry Creek Dr # 260	Longmont
Emerson Process Management	Winchester Cir	Boulder
Emss Operations Manager	Broadway St	Boulder
Intrado Inc	Dry Creek Dr # 250	Longmont
Agilent Technologies Inc	Airport Blvd # 1	Boulder
Avista Adventist Hospital	Health Park Dr	Louisville
Boulder Valley School District	Arapahoe Rd	Boulder
Education Center	Arapahoe Rd	Boulder
Mental Health Boulder County	Iris Ave	Boulder
University Corp-Atmospheric	Table Mesa Dr	Boulder
250-499 Employees		
Epsilon	Crescent Dr	Lafayette
Markit On Demand	Central Ave	Boulder

Trans First	Centennial Pkwy	Louisville

Source: Colorado Department of Labor and Employment,
<https://www.colmigateway.com/analyzer/default.asp?fromaltentry=1>

Source: Colorado Department of Labor and Employment, <http://lmigateway.coworkforce.com/>

Growth and Development Trends

Table 4.23 illustrates how Boulder County has grown in terms of population and number of housing units between 2005 and 2012.

Table 4.23. Boulder County's Change in Estimated Population and Housing Units, 2005-2013

Jurisdiction	2005 Population Estimate	2013 Population Estimate	Percent Change 2005- 2013	2005 # of Housing Units Estimate	2013 # of Housing Units Estimate	Percent Change 2005-2013
Boulder	95,088	102,760	8.07%	42,956	44,370	3.29%
Unincorporated Areas	43,261	44,970	3.95%	20,751	21,442	3.33%
Erie (part)*	6,932	9,028	30.24%	2,500	3,022	20.88%
Jamestown	284	282	-0.70%	139	141	1.44%
Lafayette	23,444	26,685	13.82%	9,714	10,620	9.33%
Longmont (part)*	81,415	90,105	10.67%	33,297	35,602	6.92%
Louisville	18,045	19,469	7.89%	7,631	8,142	6.70%
Lyons	1,642	2,102	28.01%	744	910	22.31%
Nederland	1,416	1,486	4.94%	735	750	2.04%
Superior (part)*	11,223	12,833	14.35%	4,573	4,701	2.80%
Ward	160	154	-3.75%	94	101	7.45%
Total County	282,910	309,874	9.53%	123,134	129,801	5.41%

Source: <http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251593302969>

*Part of these municipalities are in another county.

As indicated above, Boulder County has grown in recent years. Growth is projected to continue through 2040. Table 4.24 shows the population projections for the County as a whole through 2040.

Table 4.24. Population Projections for Boulder County, 2015-2040

	2015	2020	2025	2030	2035	2040
Population	312,847	332,025	350,433	364,112	374,741	386,463
Percent Change		6.13%	5.54%	3.90%	2.92%	3.13%

Source: Colorado Department of Local Affairs Demography Section,
<http://dola.colorado.gov/demog-cms/content/census-data>

Concerns about hazards and future development are addressed by hazard in the following section.

Estimating Potential Losses

Dam and Levee Failure

Existing Development

Based on the information in the hazard profile the impacts to existing development from a dam failure in Boulder County could be catastrophic. Specific inundation maps and risk information is included with specific dam emergency action plans with the Boulder County Office of Emergency Management. Due to the sensitive nature of this information, it is not included in this plan. The impacts to the County and its municipalities from a dam failure will be similar in some cases to those associated with flood events (see the flood hazard vulnerability analysis and discussion). The biggest difference is that a catastrophic dam failure has the potential to result in a much greater loss of life and destruction to property and infrastructure due to the potential speed of onset and greater depth, extent, and velocity of flooding. Another difference is that dam failures could flood areas outside of mapped floodplains.

The areas that would be significantly impacted by a dam failure include the city of Boulder, unincorporated Boulder County along Boulder Creek and South Boulder Creek, and Lyons, Longmont, and unincorporated area along St Vrain Creek. The reservoirs located in the foothills and Rocky Mountains could have the greatest potential impacts if they were to fail. These include the large reservoirs of Gross, Barker, and Button Rock. The communities exposed to the dam failure hazard, and the relative downstream impacts are captured in Table 4.25.

Table 4.25 High and Significant Hazard Dams and Downstream Communities

Name	Max Storage (acre ft)	Hazard*	Downstream Communities	Relative Down-stream Impacts
Glacier Lake	329	H	Unincorporated	Medium
Longmont Wtp Forebay Embankment	129	H	Unincorporated and Longmont	Medium
Pine Brook	140	H	Boulder	High
Barker	12,400	H	Boulder, Unincorporated	High

Baseline	6,592	H	Unincorporated	Medium
Beaver Park	2,731	H	Lyons, Longmont	Medium
Boulder	17,700	H	Unincorporated	Medium
Button Rock	20,400	H	Lyons, Longmont, Unincorporated	High
Clover Basin	984	H	Longmont	Low
Foothills	4,767	H	Longmont, Unincorporated	Medium
Gross	47,500	H	Boulder, Eldorado Springs, Unincorporated	High
Harper Lake	843	H	Louisville	Low
Hayden	765	H	Boulder	Low
Jasper	426	H	Unincorporated, El Dora	Low
Lagerman	1,832	H	Longmont	Medium
Lefthand Park	2,075	H	Ward, Unincorporated	Medium
Lefthand Valley	5,274	H	Boulder, Unincorporated	Medium
Leggett & Hillcrest	15,950	H	Boulder, Unincorporated	Medium
Marshall Lake	12,878	H	Louisville	Medium
Mc Call	722	H	Longmont, Unincorporated	Low
Pleasant Valley	4,562	H	Longmont	Medium
Silver Lake	4,819	H	Boulder,	Medium-High

Unincorporated				
Six Mile	2,186	H	Boulder, Unincorporated	Medium
Superior	500	H	Superior	Low
Valmont "A"	15,950	H	Unincorporated	Medium
Waneka	838	H	Lafayette	Low
Albion Lake	700	S	Unincorporated, Boulder	Low
Allen Lake	784	S	Unincorporated, Boulder	Low
Brainard Lake	160	S	Unincorporated	Low
Davis No. 1	185	S	Boulder, Unincorporated	Low
Erie	360	S	Erie	Low
Gaynor	754	S	Longmont, Unincorporated	Medium
Gold Lake	648	S	Unincorporated	Low
Goose Lake	1,170	S	Unincorporated, Boulder	Medium
Highland #2	4,613	S	Unincorporated	Medium
Ish #3 (East Dam)	9,065	S	rural Berthoud	Low
Los Lagos No. 3	60	S	Pinecliffe, Unincorporated	Low
Louisville No. 1	212	S	Louisville	Low
Margaret Spurgeon #1	450	S	Boulder, Unincorporated	Low

McIntosh	2,986	S	Longmont	Medium
Mesa Park	260	S	Boulder	Low
Oligarchy #1	2,161	S	Longmont, Unincorporated	Medium
Panama No. 1	7,539	S	Erie, Unincorporated	Medium

Source: National Inventory of Dams; <http://crunch.tec.army.mil/nidpublic/webpages/nid.cfm> and Division of Water Resources

Losses from a dam failure will vary based on the dam involved, warning time, and time of day. However, the potential exists for property losses into the billions and multiple deaths and injuries. Impacts to critical facilities would be similar to those identified in the flood vulnerability analysis.

There are few levees within the County, mainly within the city of Boulder. While technically not a levee, a floodwall protects the Boulder County Justice Center (located within the city of Boulder) from flooding on Boulder Creek. This floodwall is designed to provide 100-year event protection and the structure has been mapped as providing 100 year protection.

Future Development

It is important that the County keeps the dam failure hazard in mind when permitting new development, particularly downstream of the high and significant hazard dams present in the County. There are currently 32 low hazard dams in the county. These could become significant or high hazard dams if development occurs below or downstream of them.

Drought

Existing Development

Based on Boulder County's recent multi-year droughts and Colorado's drought history, it is evident that all of Boulder County is vulnerable to drought. However, the impacts of future droughts will vary by region. The agricultural industry of the County will experience hardships, including agricultural losses, and livestock feeding expenses and deaths. The County will see an increase in dry fuels, beetle kill, and associated wildfires and some loss of tourism revenue. Water supply issues for municipal, industrial, and domestic needs will be a concern for the entire County during droughts. Most of Boulder County's water comes from snow melt runoff in the high country of the western County that is captured in reservoir storage. Vulnerability increases with consecutive winters of below-average snow pack.

While widespread, the losses associated with drought are often the most difficult to track or quantify. While FEMA requires the potential losses to structures to be analyzed, drought does not normally have a structural impact. Drought can indirectly lead to property losses as a result of it contributing to extreme wildfire conditions (see discussion on wildfire vulnerability). This, combined with the potential for

significant impacts to water intensive activities such as agriculture, wildfire suppression, municipal usage, commerce, tourism, and wildlife preservation, can lead to widespread economic ramifications.

Future Development

Drought vulnerability will increase with future development as there will be increased demands for limited water resources. Future growth in the unincorporated areas will mean more wells and more demands on groundwater resources.

Earthquake

Earthquakes represent a low probability, high consequence hazard for Boulder County. Colorado has a relatively short historic record of earthquakes, which makes for a limited data set when making assumptions based on past events. A lot of unknowns remain about the earthquake potential in Boulder County and Colorado in general.

Existing Development

Based on the fact that there have been earthquake epicenters as well as potentially active faults inside the County boundaries, as well as in neighboring counties, earthquakes will likely occur in the future. Based on historic events, these will likely be in the range of Magnitude 5.5 or lower, which is strong enough to be felt and potentially cause damage. According to the USGS, damage usually occurs with earthquakes in the Magnitude 4-5 range, but many variables affect damage such as building age, soil type, distance from the epicenter, etc. Older, historic buildings could suffer structural damage from a moderate sized event, but most impacts would likely be to non-structural items within the buildings such as light fixtures, toppling of shelves, cracked walls and chimneys. Falling items within buildings will likely pose the greatest risk to life safety.

The Colorado Geological Survey (CGS) used HAZUS-MH, FEMA’s loss estimation software, to model earthquake risk from various faults in every county in the state. This information is included as an earthquake evaluation report annex to the 2007 Colorado Natural Hazards Mitigation Plan.

The CGS ran a series of deterministic scenarios for selected Colorado faults using HAZUS-MH to assess potential economic and social losses due to earthquake activity in Colorado. Deterministic analyses provide “what if” scenarios (e.g., determines what would happen if an earthquake of a certain magnitude occurred on a particular fault). The earthquake magnitudes used for each fault were the “maximum credible earthquake” as determined by the U.S. Geological Survey. The faults analyzed for Boulder County were Frontal, Golden, Mosquito, Ute Pass, Valmont, Walnut Creek, and Williams Fork (see Figure 5 in Section 4.2). Table 4.26 summarizes the results for Boulder County.

Table 4.26. Potential Earthquake Losses in Boulder County by Fault

Fault/Magnitude	Fatalities		Loss Ratio (%)**
	at 2pm	Total Economic Loss (in millions)*	

Frontal M7.0	0	56 Million	0.15%
Golden M6.5	20	1.27 Billion	3.78%
Mosquito M7.0	0	20 Million	0.04%
Ute Pass M7.0	0	45 Million	0.12%
Valmont M5	2	582 Million	1.92%
Walnut Creek M6.5	98	2.9 Billion	9.01%
Williams Fork M6.75	0	21 Million	0.05%

Source: HAZUS MH models with depth of 2 km, attenuation function of West US Extension 2008

*Direct and indirect losses

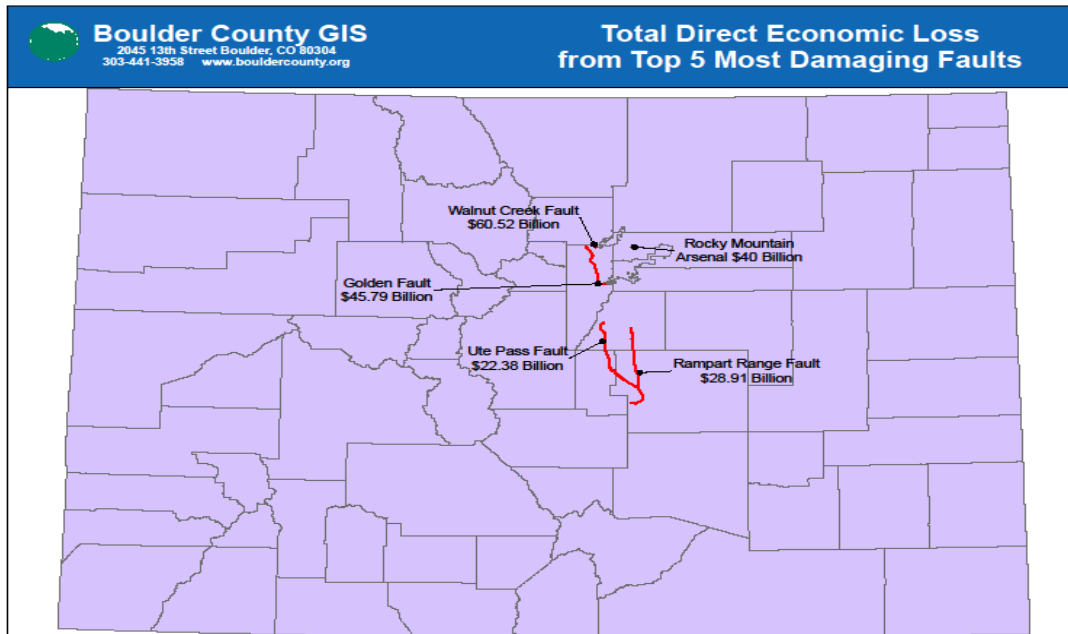
**Percentage of the total building stock value damaged; the higher this ratio, the more difficult it is to restore a community to viability (loss ratios 10 percent or greater are considered by FEMA to be critical.)

Note: County HAZUS-MH Inventory (HAZUS-MH 2000, including Broomfield): \$25.46 billion

According to the CGS report, the Golden, Ute Pass, and Walnut Creek faults are considered among the top five potentially most damaging faults in the state (includes damage to other counties in the Denver Metropolitan Area). The top five, in order, are listed below and illustrated in Figure 4.14.

- 1) Rocky Mountain Arsenal
- 2) Golden
- 3) Rampart Range
- 4) Ute Pass
- 5) Walnut Creek

Figure 4.14 Total Direct Economic Loss from Top 5 Most Damaging Faults



During the development of this plan in 2013, a HAZUS-MH probabilistic earthquake scenario was run with the latest version of HAZUS-MH (MR3, released October 2007). The methodology includes probabilistic seismic hazard contour maps developed by the USGS for the 2002 update of the National Seismic Hazard Maps that are included with HAZUS-MH. The USGS maps provide estimates of potential ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively. The 2,500-year return period analyzes ground shaking estimates with a 2 percent probability of being exceeded in 50 years, from the various seismic sources in the area. The International Building Code uses this level of ground shaking for building design in seismic areas. The CGS believes that the USGS probabilistic shaking maps likely underestimate the hazard due to the limited studies of the earthquake hazard in the state to base the shaking maps on. Table 20 summarizes the results of the 2,500-year HAZUS-MH scenario. The total economic losses could exceed \$1 billion, which equates to a loss ratio of 4 percent when divided by the value of the total HAZUS-MH inventory in the County. Over 10 percent of the total number of buildings in the County will be at least moderately damaged. Note that the HAZUS-MH region built for the County includes Broomfield, which is now its own city and county. For comparative purposes a 100 year probabilistic scenario was executed in HAZUS-MH, which analyzes the more likely earthquake ground motions. This scenario resulted in little to no damage.

Table 4.27. HAZUS-MH Earthquake Loss Estimation 2,500-Year Scenario Results

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 11,843 Moderate: 4,402 Extensive: 590 Complete: 125
Building and Income Related Losses	\$372.72 million 58% of damage related to residential structures 21% of loss due to business interruption
Total Economic Losses (includes building, income and lifeline losses)	\$379.94 million
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 63 Requiring hospitalization: 7 Life threatening: 0 Fatalities: 1
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 73 Requiring hospitalization: 9 Life threatening: 1 Fatalities: 1
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 64 Requiring hospitalization: 8 Life threatening: 1 Fatalities: 1
Transportation System Economic Losses	\$2.1 million
Utility System Economic Losses	\$5.12 million
Displaced Households	174
Shelter Requirements	108

Source: HAZUS Global Probabilistic 2,500 Year model with a magnitude of 5.0

Future Development

Any new construction built to modern building codes in the County should generally be able to withstand earthquakes. That said, the potential for non structural damage will increase with new development. Continued growth of population in the County could potentially expose more persons to earthquakes and their related hazards.

Flood

Existing Development

Flooding and floodplain management are significant issues in Boulder County and some of the incorporated areas. The significance of this hazard, the requirements for Flood Mitigation Assistance plans, and the availability of digital hazard data in GIS drove the development of a detailed vulnerability assessment that is discussed in the following pages.

Methodology

The HMPC used GIS to quantify the potential flood losses to the County and cities within the mapped floodplain areas. The first step was to identify what is exposed to the various flood hazards. This entailed overlaying a countywide GIS layer of the 100 and 500 year floodplains (digitized by the city of Boulder based on the FEMA FIRM's) on parcels that contained data on structures. The flood layer for city of Boulder was determined to be the best available data countywide. The layer does not include changes associated with the recent restudy of South Boulder Creek. A separate countywide flood layer used for zoning purposes was not utilized because it did not differentiate between 100 and 500 year floodplains. A DFIRM is completed for the County. GIS was used to create a centroid, or point, representing the center of each parcel polygon, which was intersected with the floodplain layer. For the purposes of this analysis, if the parcel centroid intersected a flood zone it was assumed to be flooded. Another assumption with this model is that every parcel with an improved value greater than zero was assumed to be developed in some way. Only improved parcels, and the value of those improvements, were analyzed and aggregated by property type and flood zone. The parcels were segregated and analyzed for the unincorporated areas along with the following incorporated cities of Boulder, Erie, Jamestown, Lafayette, Longmont, Louisville, Lyons, Nederland, Superior and Ward. The centroids of parcels that are flooded are displayed on these maps as colored points that correspond to four property types: residential, commercial, and agricultural.

The next step was to estimate potential losses to the properties located within a floodplain. The result of the exposure analysis summarizes the total values at risk in the floodplain. When a flood occurs, seldom does the event cause total destruction of an area. Potential losses from flooding are related to a variety of factors including flood depth, flood velocity, building type, and construction. Based on FEMA flood depth-damage curves, the percent of damage is directly related to the flood depth. FEMA's flood benefit-cost module uses this simplified approach to model flood damage based on building type and flood depth. A damage estimation of 20 percent of the total value and 20 percent of the contents value of a one-story structure with no basement was used. While there are several limitations to this model, it does present a methodology to estimate potential damages.

The results of the vulnerability analysis are summarized in Table 4.28 showing loss by jurisdiction to the 100 year and 500 year events, ranked in order of total loss. Table 4.29 contains an estimate of population affected by jurisdiction, by applying the 2010 Census average household size of 2.39 to the count of residential structures affected. Tables 28-30 detail the vulnerability for the respective jurisdictions. The following assumptions were made to calculate loss estimates in these tables:

The content value was estimated at 50 percent of the structure value based on guidance used in HAZUS-MH models. This was applied to all structures; however, contents of commercial structures may be 100 to 150 percent of the structure value.

Total value includes structure plus contents.

An assumed flood damage of 20 percent of the total value was calculated based on FEMA flood depth-damage curves assuming a two-foot flood depth.

This model does not account for structures within the 100-year floodplain that may be elevated above base flood elevation in accordance with local floodplain development requirements.

The results show an estimate of what the flood losses to structures would be if a 100-year or 500-year flood was to occur in any of the municipalities and unincorporated. The loss ratio column shows the ratio of the loss estimate for a particular jurisdiction divided by the total value of structures in the jurisdiction. This provides a measure of the overall impact to jurisdiction. Jurisdictions with loss ratios of 10 percent or higher are considered by FEMA to have serious recovery issues. The structure ratio shows the ratio of damaged structures compared to the overall number of structures in the jurisdiction.

Table 4.28. Boulder County Property and Values in 100- and 500-Year Flood Zones

Boulder County Property and Values in 100- and 500-Year Flood Zones by Jurisdiction			
Location	Improved Parcel Count in Flood Zone	Improved Value (\$ in Flood Zone)	Contents Value (\$) in Flood Zone
100-Year Flood Zone			
City of Boulder	3,160	\$1,433,140,206	\$716,570,103
Unincorporated County	840	\$193,937,484	\$96,968,742
City of Longmont	643	\$112,884,529	\$56,442,265
City of Lafayette	73	\$46,915,860	\$23,457,930
City of Louisville	96	\$35,763,116	\$17,881,558
Town of Lyons	148	\$23,869,313	\$11,934,657
Town of Jamestown	15	\$3,052,700	\$1,526,350
Town of Nederland	23	\$1,975,364	\$987,682
Town of Erie	6	\$1,365,400	\$682,700
Town of Superior	14	\$1,355,458	\$677,729
Town of Ward	0	\$0	\$0
Total	5,018	\$1,854,259,430	\$927,129,715
500-Year Flood Zone			
City of Boulder	2,387	\$1,120,530,891	\$560,265,446
City of Longmont	2,153	\$381,059,340	\$190,529,670

Unincorporated			
County	286	\$51,211,025	\$25,605,513
City of Louisville	114	\$32,480,553	\$16,240,277
Town of Lyons	43	\$11,746,827	\$5,873,414
City of Lafayette	11	\$10,868,600	\$5,434,300
Town of Superior	20	\$5,783,796	\$2,891,898
Town of Jamestown	11	\$1,764,800	\$882,400
Town of Erie	0	\$0	\$0
Town of Nederland	0	\$0	\$0
Town of Ward	0	\$0	\$0
Total	5,025	\$1,615,445,832	\$807,722,916

Combined 100- and 500-Year Flood Zones			
City of Boulder	5,547	\$2,553,671,097	1,276,835,549
City of Longmont	2,796	\$493,943,869	246,971,935
Unincorporated			
County	1,126	\$245,148,509	122,574,255
City of Louisville	210	\$68,243,669	34,121,835
City of Lafayette	84	\$57,784,460	28,892,230
Town of Lyons	191	\$35,616,140	17,808,070
Town of Superior	34	\$7,139,254	3,569,627
Town of Jamestown	26	\$4,817,500	2,408,750
Town of Erie	6	\$1,365,400	682,700
Town of Nederland	23	\$1,975,364	987,682
Town of Ward	0	\$0	0
Total	10,043	\$3,469,705,262	1,734,852,631

Location	Total Value (\$) in Flood Zone	Loss Estimate (\$)	Total Improved Value (\$)
100-Year Flood Zone			
City of Boulder	\$0	\$0	\$12,922,894,104
Unincorporated			
County	\$0	\$0	\$6,071,209,429
City of Longmont	\$0	\$0	\$6,136,098,962
City of Lafayette	\$0	\$0	\$2,183,657,823
City of Louisville	\$0	\$0	\$2,030,488,953
Town of Lyons	\$0	\$0	\$249,102,173
Town of Jamestown	\$0	\$0	\$28,046,000
Town of Nederland	\$0	\$0	\$133,042,608
Town of Erie	\$0	\$0	\$633,046,491
Town of Superior	\$0	\$0	\$1,057,050,991
Town of Ward	\$0	\$0	\$8,763,000

Total	\$0	\$0	\$31,453,400,534

500-Year Flood Zone

City of Boulder	\$0	\$0	\$12,922,894,104
City of Longmont	\$0	\$0	\$6,136,098,962
Unincorporated			
County	\$0	\$0	\$6,071,209,429
City of Louisville	\$0	\$0	\$2,030,488,953
Town of Lyons	\$0	\$0	\$249,102,173
City of Lafayette	\$0	\$0	\$2,183,657,823
Town of Superior	\$0	\$0	\$1,057,050,991
Town of Jamestown	\$0	\$0	\$28,046,000
Town of Erie	\$0	\$0	\$633,046,491
Town of Nederland	\$0	\$0	\$133,042,608
Town of Ward	\$0	\$0	\$8,763,000
Total	\$0	\$0	\$31,453,400,534

Combined 100- and 500-Year Flood Zones

City of Boulder	\$0	\$0	\$12,922,894,104
City of Longmont	\$0	\$0	\$6,136,098,962
Unincorporated			
County	\$0	\$0	\$6,071,209,429
City of Louisville	\$0	\$0	\$2,030,488,953
City of Lafayette	\$86,676,690	\$17,335,338	\$2,183,657,823
Town of Lyons	\$0	\$0	\$249,102,173
Town of Superior	\$10,708,881	\$2,141,776	\$1,057,050,991
Town of Jamestown	\$7,226,250	\$1,445,250	\$28,046,000
Town of Erie	\$0	\$0	\$633,046,491
Town of Nederland	\$0	\$0	\$133,042,608
Town of Ward	\$0	\$0	\$8,763,000
Total	\$0	\$0	\$31,453,400,534

Location	Loss Ratio (%)	Total Improved Parcel Count	Structure Ratio (%)
100-Year Flood Zone			
City of Boulder	0.00%	33,274	0.00%
Unincorporated			
County	0.00%	21,723	0.00%
City of Longmont	0.00%	29,716	0.00%
City of Lafayette	0.00%	9,876	0.00%
City of Louisville	0.00%	7,350	0.00%
Town of Lyons	0.00%	961	0.00%

Town of Jamestown	0.00%	137	0.00%
Town of Nederland	0.00%	740	0.00%
Town of Erie	0.00%	2,997	0.00%
Town of Superior	0.00%	3,552	0.00%
Town of Ward	0.00%	105	0.00%
Total	0.00%	110,431	0.00%

500-Year Flood Zone

City of Boulder	0.00%	33,274	0.00%
City of Longmont	0.00%	29,716	0.00%
Unincorporated County	0.00%	21,723	0.00%
City of Louisville	0.00%	7,350	0.00%
Town of Lyons	0.00%	961	0.00%
City of Lafayette	0.00%	9,876	0.00%
Town of Superior	0.00%	3,552	0.00%
Town of Jamestown	0.00%	137	0.00%
Town of Erie	0.00%	2,997	0.00%
Town of Nederland	0.00%	740	0.00%
Town of Ward	0.00%	105	0.00%
Total	0.00%	110,431	0.00%

Combined 100- and 500-Year Flood Zones

City of Boulder	0.00%	33,274	0.00%
City of Longmont	0.00%	29,716	0.00%
Unincorporated County	0.00%	21,723	0.00%
City of Louisville	0.00%	7,350	0.00%
City of Lafayette	2.65%	9,876	0.85%
Town of Lyons	0.00%	961	0.00%
Town of Superior	0.68%	3,552	0.96%
Town of Jamestown	17.18%	137	18.98%
Town of Erie	0.00%	2,997	0.00%
Town of Nederland	0.00%	740	0.00%
Town of Ward	0.00%	105	0.00%
Total	0.00%	110,431	0.00%

Table 4.29. Boulder County Population Affected by Flood

**Boulder County
Population Affected By
Flood**

Location	Population Est. 100 year Flood	Population Est. 500 year Flood	Population 100 and 500 Year Flood
City of Boulder	6735	4758	11494
City of Longmont	1274	4546	5820
Unincorporated County	1709	600	2309
City of Louisville	191	253	445
Town of Lyons	342	86	428
Town of Erie	12	0	12
City of Lafayette	108	10	117
Town of Jamestown	36	24	60
Town of Nederland	50	0	50
Town of Superior	29	41	69

The city of Boulder was included as part of the analysis, even though it has its own hazard mitigation plan, to illustrate the large degree of vulnerability associated with it in relation to the rest of the County. County resources would be involved in a flood event in the city of Boulder, and a number of County government buildings are located in the city of Boulder. There are significant unincorporated areas that are at risk to flooding (primarily along Fourmile Canyon and Wonderland creeks) and along the South Boulder Creek floodplain. Another pocket of risk in the unincorporated County includes areas along Left Hand Creek. The risk to the unincorporated area along the significant floodplains of Boulder Creek and St. Vrain Creek in the eastern County is relatively minor, tempered by wise floodplain management practices.

Besides the city of Boulder, the highest losses to flood would be in Longmont, unincorporated areas, and Louisville. Note, however, the relatively high loss ratios for Lyons and Jamestown. The analysis indicates that a 500 year flood in Longmont would be considerably more damaging than a 100 year event. At the request of the Town of Erie the entire inventory in both Boulder and Weld counties was analyzed. The majority of the risk in Erie is located in Weld County. The digital floodplain provided by the Town does not reflect a Letter of Map Revision associated with channel improvements, and thus may overestimate the current flood hazard.

Unincorporated Boulder County

Table 4.30. Unincorporated Boulder County's Property and Values in 100- and 500-Year Flood Zones

Unincorporated Boulder County's Property and Values in 100- and 500-Year Flood Zones				
Property Type	Improved Parcel Count	Improved Value (\$)	Contents Value (\$)	Total Value (\$)
100-Year Flood Zone				
Residential	715	\$152,161,744	\$76,080,872	\$228,242,616
Commercial	24	\$7,566,655	\$3,783,328	\$11,349,983
Exempt	30	\$5,048,860	\$2,524,430	\$7,573,290
Industrial	17	\$7,996,700	\$3,998,350	\$11,995,050
Agricultural	54	\$21,163,525	\$10,581,763	\$31,745,288
Total	840	\$193,937,484	\$96,968,742	\$290,906,226
Population estimate for residences:		1709		
500-Year Flood Zone				
Residential	251	\$42,205,625	\$21,102,813	\$63,308,438
Commercial	5	\$1,464,800	\$732,400	\$2,197,200
Exempt	4	\$293,600	\$146,800	\$440,400
Industrial	3	\$834,000	\$417,000	\$1,251,000
Agricultural	23	\$6,413,000	\$3,206,500	\$9,619,500
Total	286	\$51,211,025	\$25,605,513	\$76,816,538
Population estimate for residences:		600		
Combined 100- and 500-Year Flood Zones				
Residential	966	\$194,367,369	\$97,183,685	\$291,551,054
Commercial	29	\$9,031,455	\$4,515,728	\$13,547,183
Exempt	34	\$5,342,460	\$2,671,230	\$8,013,690
Industrial	20	\$8,830,700	\$4,415,350	\$13,246,050
Agricultural	77	\$27,576,525	\$13,788,263	\$41,364,788
Total	1126	\$245,148,509	\$122,574,255	\$367,722,764
Population estimate for residences:		2,309		

Details on specific communities in Boulder County can be found in the Annex's A-L.

Figure 4.15. Boulder County Flood Hazard (East)

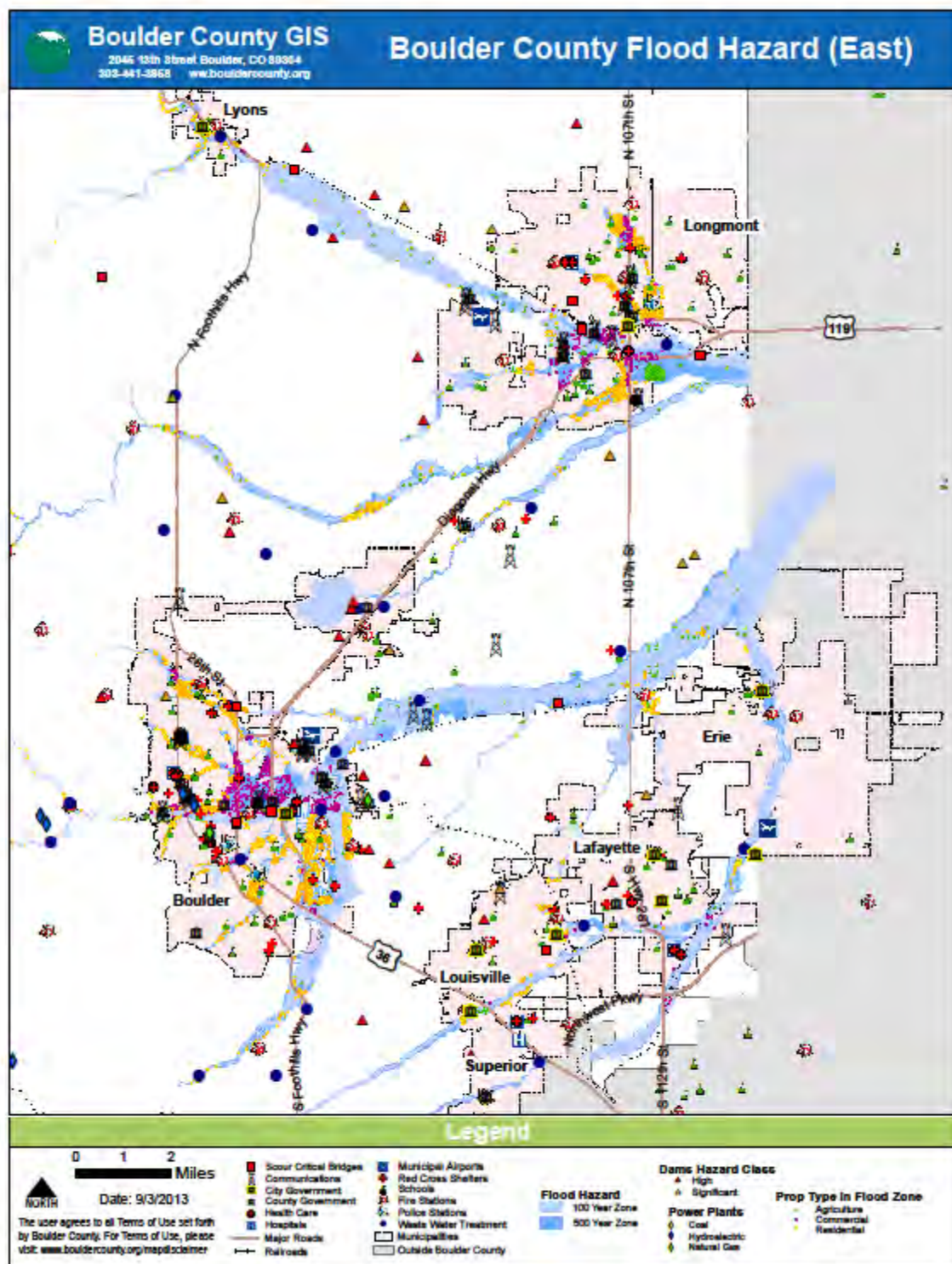
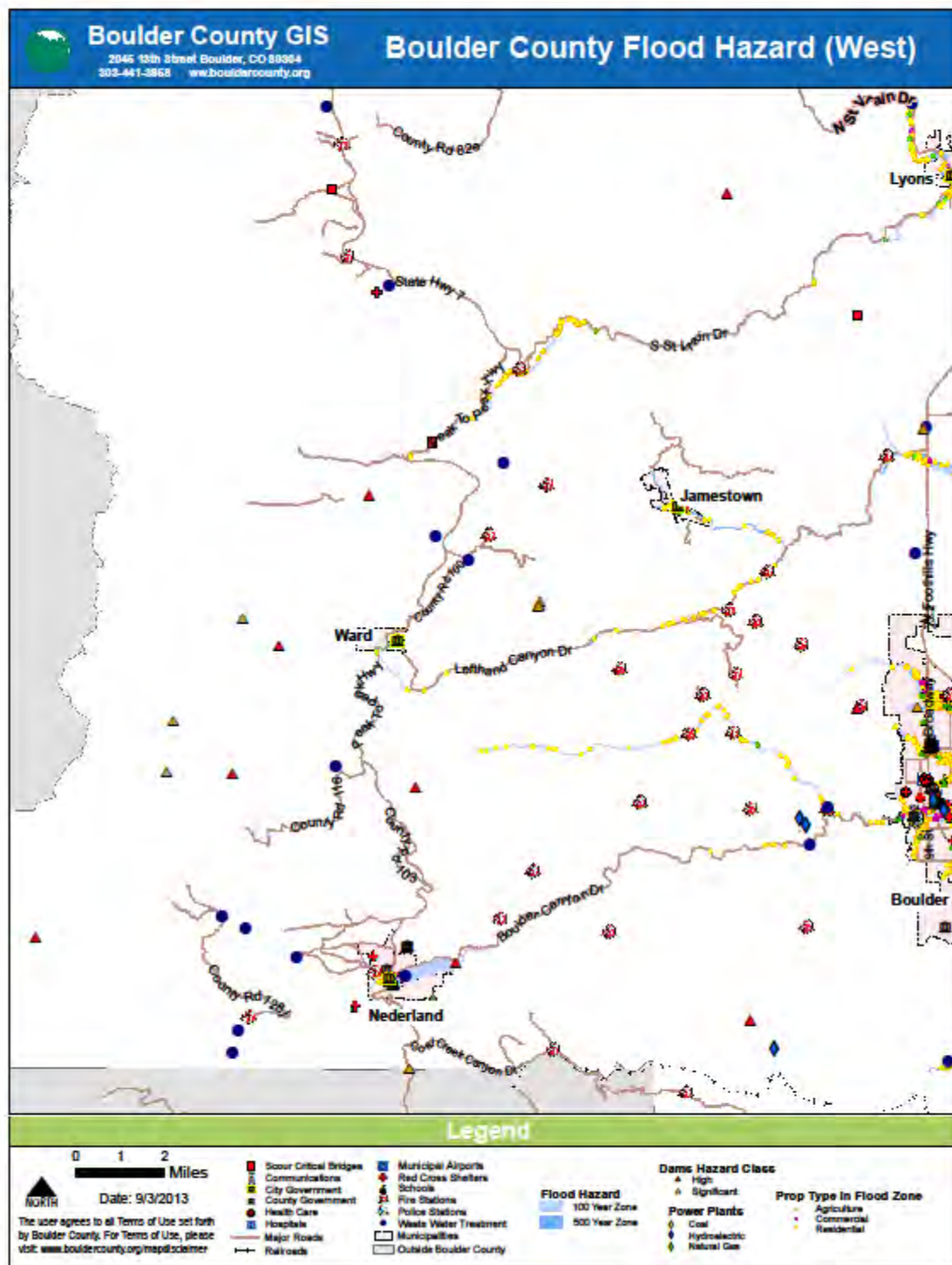


Figure 4.16. Boulder County Flood Hazard (West)



Critical Facilities

To estimate the potential impact of floods on critical facilities a GIS overlay was performed of the flood hazard layer on existing critical facilities point locations. The results are shown in Table 4.31 and on the maps in Figures 4.33-4.41. Flood zone A corresponds to the 100 year flood, and X500 the 500 year flood.

Table 4.31 Critical Facilities in Flood Hazard Areas

Location	Facility Type	Facility Name	Flood Zone
Boulder	County Government Buildings	Boulder Community Communication Center	A
Boulder	County Government Buildings	Clerk & Recorder's Building	A
Boulder	County Government Buildings	Boulder County Justice Center	A
Boulder	Daycares	First Presbyterian Preschool	A
Boulder	Daycares	Family Housing Children's Center	A
Boulder	Daycares	New Horizon Cooperative Preschool	A
Boulder	Daycares	YMCA Of Boulder Valley Mapleton Branch	A
Boulder	Daycares	Bitsy Montessori School	A
Boulder	Daycares	Cottage School	A
Boulder	Daycares	BVSKE Crest View	A
Boulder	Daycares	Cottage School The	A
Boulder	Elderly Facility	Sunrise Assisted Living	A
Boulder	Elderly Facility	Boulder Good Samaritan Center	A
Boulder	Elderly Facility	Taft Towers - Good Samaritan Vllg.	A
Boulder	Elderly Facility	Boulder Good Samaritan Village	A
Boulder	Health Care	Boulder Community Foothills	A
Boulder	Hospitals	Boulder Community Hospital Main	A
Boulder	Police	Sheriff Department-Evidence	A
Boulder	Schools	Boulder High School	A
Boulder	Schools	Columbine Elementary	A
Boulder	Schools	Creskide Elementary	A
Boulder	Schools	Crest View Elementary	A
Boulder	Shelters	Boulder High School	A
Boulder	County Government Buildings	Former Kaiser Building	X500
Boulder	Elderly Facility	Presbyterian Manor	X500
Boulder	Elderly Facility	Alterra Wyndwood at Ridge Point	X500
Boulder	Fire Stations	Boulder Fire Dept	X500
Boulder	Police	Boulder Police Dept	X500
Boulder	Schools	Flatirons Elementary	X500
Erie	Waste Water Treatment	Smith Orville & Billie	A
Erie	Water Reclamation	Water Reclamation Facility	AE
Lafayette	Waste Water Treatment	Lafayette City of	A

Location	Facility Type	Facility Name	Flood Zone
Longmont	County Government Buildings	Boulder Road Maintenance Transportation Dept	A
Longmont	Schools	Ute Creek Secondary Academy Longmont C	A
Longmont	Waste Water Treatment	Waste Water Facility	A
Longmont	City Government Buildings	Parks Maintenance	X500
Longmont	City Government Buildings	Parks Maintenance	X500
Longmont	City Government Buildings	Ice Pavilion	X500
Longmont	City Government Buildings	Memorial Bldg	X500
Longmont	City Government Buildings	Kanemoto Activity Pool	X500
Longmont	City Government Buildings	Roosevelt Activity Pool	X500
Longmont	City Government Buildings	Senior Center	X500
Longmont	Daycares	Our Childcare Infant Nursery	X500
Longmont	Daycares	Scribbles Academy	X500
Longmont	Daycares	Cottage School	X500
Longmont	Schools	Columbine Elementary	X500
Longmont	Schools	Northridge Elementary	X500
Louisville	County Government Buildings	Louisville Social Services	A
Louisville	County Government Buildings	Louisville Annex (Clerk and Records) Building	A
Louisville	Waste Water Treatment	City of Louisville	A
Unincorporated	Communications	KVCU 1190	A
Unincorporated	Natural Gas Plant	Public Service Company Louisville Site	A
Unincorporated	Waste Water Treatment	Gibson Bob & Bret	A
Unincorporated	Waste Water Treatment	75th Street Wastewater Treatment Plant	X500

Source: Based on data from Boulder County, City of Boulder, City of Longmont

Replacement values were not available with the data, thus an estimate of potential loss could not be performed. Impacts to any of these facilities could have wide ranging ramifications, in addition to property damage.

Bridges on the previous maps are from the National Bridge Inventory database that comes with HAZUS-MH. One of the database items includes a “scour index” that is used to quantify the vulnerability of bridges to scour during a flood. Bridges with a scour index between 1 and 3 are considered “scour critical,” or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition. These bridges are listed in Table 4.32. On a side note, only one bridge in the County is

considered by the Bureau of Transportation Statistics as “structurally deficient.” This is the southbound ramp to US 36 at Baseline Road.

Table 4.32. Scour Critical Bridges

Name	Scour Index	Owner	Jurisdiction
County Road 103	3	County Highway Agency	Unincorporated
Sunset St (Cr 15)	3	County Highway Agency	Longmont
N. 95th St (Cr 19)	3	County Highway Agency	Unincorporated
N. 95th St (Cr 19)	3	County Highway Agency	Louisville
County Road 23	3	County Highway Agency	Unincorporated
County Road 31	3	County Highway Agency	Unincorporated
N. 119th St (Cr 3)	3	County Highway Agency	Longmont
County Road 49	3	County Highway Agency	Unincorporated
County Road 84W	3	County Highway Agency	Unincorporated
US 36 FR RD	3	State Highway Agency	Boulder
SH 7 ML WBND	3	State Highway Agency	Boulder
US 36 ML WBND	3	State Highway Agency	Boulder
US 36 ML EBND	3	State Highway Agency	Boulder
US 36 ML	3	State Highway Agency	Boulder
Sunset St (Cr 15)	3	City or Municipal Highway Agency	Longmont

Source: Boulder County Department of Transportation

Life, Safety, Health, Procedures for Warning and Evacuation

Flooding, has the potential to affect road conditions to the point where evacuation routes are disrupted and first responder access is cut off from specific locations. This can be exacerbated in areas of the county where alternate routes are limited, most notably the roads in the mountain canyons. These roads generally serve as the only thoroughfare up and down the canyons which are poorly interconnected. As demonstrated by the September 2013 flood event, roads in the canyons built immediately adjacent to creek channels are subject to partial or complete local washouts. During this event, road washouts

stranded significant portions of the mountain communities in their homes waiting for evacuation by helicopter.

Natural Floodplain Function

58% of the regulatory floodplain in Boulder County is protected as open space, thus, new development is not a threat to the natural floodplain functions within this area. Beyond these protected lands development of new structures within the flood fringe is possible on privately property, but Boulder County Land Use Code places restrictions on total building footprint area on those properties. Together, the County's land use process and floodplain management regulations will minimize the effect of development on the natural functions of the floodplain.

National Flood Insurance Program/Community Rating System

The National Flood Insurance Program (NFIP) is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses. A jurisdiction's eligibility to participate is premised on their adoption and enforcement of state and community floodplain management regulations intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Thus, participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses.

The Community Rating System (CRS) was created in 1990 to recognize communities whose floodplain management activities go above and beyond the NFIP's minimum requirements. Under the CRS, if a community implements certain program activities, such as public information, mapping, regulatory, loss reduction, and/or flood preparedness activities, then its residents can qualify for a flood insurance premium rate reduction. Communities can a classification of 1 through 10 with discounts of 45 percent discount to 0 respectively.

Table 4.33 provides detailed information on NFIP participation in NFIP participating communities in Boulder County.

Table 4.33. Community Participation in the NFIP and Community Rating System

Jurisdiction	Date Joined	Effective FIRM Date	Policies in Force 09/30/14	Insurance in Force (\$)	Number of Claims since 1978	Claims Totals(\$)	Community Rating System Rating
Boulder County	2/1/1979	12/18/2012	975	198628900	64	188,433	7
City of Boulder	7/17/1978	12/18/2012	3,504	800,861,300	96	209,764	5
Town of Erie*	10/17/1978	12/18/2012	32	7,635,900	2	986	n/a
Town of Jamestown	7/18/1983	12/18/2012	12	3,013,800	4	696	n/a
City of Lafayette	3/18/1980	12/18/2012	36	10,118,500	2	3145	n/a
City of Longmont	7/5/1977	12/18/2012	281	67,294,800	10	2,260	8
City of Louisville	5/4/1973	12/18/2012	62	18,370,900	0	0	8
Town of Lyons	8/1/1980	12/18/2012	75	13,839,600	10	6,793	n/a
Town of Nederland	8/1/1979	12/18/2012	12	2,634,800	1	7463	n/a
Town of Superior	9/28/1979	12/18/2012	12	2,736,400	0	0	n/a

Source: Watershed and Flood Protection Section of the Colorado Water Conservation Board, Department of Natural Resources

*Includes Weld County

There were no repetitive losses in Boulder County at the time of this plan development.

Future Development

Any new construction in mapped flood hazard areas built in accordance with local floodplain management ordinances should be elevated to the 100-year flood, at a minimum. Thus vulnerability to flooding is not considered to be increasing with development. However, there are areas that are not mapped that could still be flood prone.

As a result of exacerbated urban flooding due to development in the plains, the potential impact will include possible injury to individuals; damage to private property such as automobiles and residential, commercial, or industrial buildings; and degradation of natural floodplain functions due to excessive pollution from urban runoff.

Higher population density within the floodplain will put more individuals at risk of being affected by flooding. That risk could manifest itself as disrupted building access, disrupted services like electricity or plumbing, or even economic hardship due to disruption of local commerce. As a part of Boulder County's floodplain management regulatory policies, no new development within the floodplain will be permitted if it would cause a rise in Base Flood Elevation for any other insurable structures. As such, the only impact to anthropogenic development within the floodplain beyond that which exists currently will be to those structures built anew.

Larger precipitation events will likely impose greater stress on people, property, and natural floodplain functions. With more intense events, private property and natural areas within the floodplain will suffer greater damage. This poses a threat of inadequate recovery time, especially for the beneficial functions afforded by natural areas within floodplains. The goals, objectives, and action plan presented in this report are in part meant to accommodate this expected shift in the dynamic flood hazard in Boulder County.

Landslide/Debris Flow/Rockfall

Existing Development

Research in the hazard profile for Landslide/Debris Flow/Rockfall revealed sporadic impacts in western portions of the County, and repetitive debris flow issues in Jamestown and other areas that have had recent wildfire burns. Future property losses would likely be minor, based on patterns of previous events. Rockfall impacts on western Boulder County highways and county roads have the potential to cause significant indirect economic loss, in addition to the potential for serious injury or death. The most significant road that could be impacted by rockfall and related road closures is Highway 119 in Boulder County between Nederland and Boulder. Economic losses from this road closure and resulting detours could be estimated with traffic counts and detour mileage.

Critical facilities at risk include the Jamestown Fire Department which has been impacted by debris flows.

Future Development

Steep slope regulations should limit problems from these hazards in the future, thus the exposure to this hazard is not anticipated to grow.

Lightning

Existing Development

It is difficult to quantify where specific losses will occur due to the random nature of this hazard. Given the lightning statistics for Colorado and Boulder County, the County remains at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. It is difficult to quantify future deaths and injuries due to lightning.

Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Future Development

New critical facilities such as communications towers should be built with lightning protection measures.

Communicable and Zoonotic Diseases

Communicable (person to person diseases such as the flu) and Zoonotic (animal to human diseases such as West Nile Virus) diseases could result in serious human and economic losses.

The total County population of 305,318 (2012 estimate) could potentially be exposed to various communicable and zoonotic disease outbreaks. Virus's/fungi/bacteria will be present in Colorado into the future, but the severity changes from year to year, depending on variables such as weather patterns, the mosquito population, the bird population, and immunity in humans. In a severe outbreak, approximately 30 percent of the state's overall population, 20 percent among working adults, and 40 percent among school-age children can be affected. Employee absenteeism, due to illness, the need to care for ill family members, and fear of infection, may cause government operations to be reduced by 30-49 percent of normal.

The number of hospitalizations and deaths will depend on the virulence of the virus/fungi/bacteria. Risk groups cannot be predicted with certainty. During the annual influenza season, infants, the elderly, the chronically ill, and pregnant women are usually at higher risk. But, in contrast, in the 1918 pandemic, most deaths occurred among young, previously healthy adults. Given the nature of protective measures, such as washing one's hands, wearing long-sleeved clothing and using bug spray, the responsibility for protection can and should be an individual responsibility.

Future Development

As population trends continue to increase, more persons will be exposed to the communicable and zoonotic diseases, therefore increasing risk as well as pressure on local medical and emergency services.

Severe Winter Storms

Existing Development

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. Travelers on highways in Boulder County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions. The County can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Winter storms contribute directly to other hazards in this plan: extreme temperatures (cold).

Research presented in Section 4 Severe Winter Storms yielded significant impacts from this hazard in the past. Structural losses to buildings are possible and structural damage from winter storms in Colorado has resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The County's elderly population is a potentially vulnerable demographic during severe winter storms. The commuting population, particularly those that commute to the Denver metropolitan area, is another demographic potentially at risk during winter storm events.

Smaller mountain communities such as Ward and Jamestown may become isolated during winter storm events, in addition to individuals living in the foothills of unincorporated Boulder County. Persons that

choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Future Development

Future residential or commercial buildings built to code should be able to withstand snow loads from severe winter storms. Population and commercial growth in the county will increase the potential for complications with traffic and commerce interruptions associated winter storms.

As building and population trends continue to increase, more persons will be exposed to the winter storm hazard, therefore increasing pressure on local government snow removal and emergency services.

Subsidence

Existing Development

A 1986 study on land subsidence in southeastern Boulder County conducted by the State of Colorado Department of Natural Resources Mined Land Reclamation Division found that the major period of subsidence occurred within 30 to 40 years after the mining was completed. Since that time (around 1950), subsidence events have occurred on an erratic basis. It is not possible to predict the exact location where future subsidence may occur or the magnitude of subsidence events in terms of size or disturbance. This study found that subsidence-related damage to homes in the Louisville and Lafayette area was within a range of \$700 to \$2,900 per home (\$1,272 to \$5,286 in 2013 dollars). Losses from future subsidence events are predicted to be sporadic and relatively minor. Impacts to critical facilities are anticipated to be minor.

Future Development

Land use and development controls should limit impacts to future development from subsidence. Lafayette's Comprehensive Plan recommends that no building occur on high hazard zones, and that pre-construction design considerations occur regardless of the hazard zone involved. Erie subdivision regulations have similar controls. The 1986 report recommends that utility lines installed in high hazard zones have special construction to minimize possible adverse affects of subsidence.

Tornado

Existing Development

The National Climatic Data Center's 2013 Annual Summaries indicates that based on national state-level tornado data from 1991 to 2010, Colorado has 53 tornado's. When the tornado frequency per 10,000 square miles is compared with other states, Colorado ranks 39th for frequency and ties for 35th with 16 other states that average 0 deaths per 10,000 square miles. During a 64-year period (1950-2013), 10 tornadoes occurred in Boulder County, which equates to one tornado every 6.4 years, on average. Of these 10 tornadoes, two were magnitude F0, six were F1, and two were F2. While tornadoes can occur anywhere, the likelihood of damaging tornadoes is highest in eastern Boulder County, since it is further away from the foothills and closest to the eastern plains. The eastern Boulder County communities of Longmont and Erie have a higher risk than other communities in the planning area. The Weld County

tornado in May 2008 occurred just east of Boulder County, damaging over 200 homes along a 10 mile path, and was an EF 3, so a damaging tornado is possible. Due to the random nature of tornadoes it is difficult to quantify losses further, or try to estimate impacts to critical facilities.

Future Development

Eastern unincorporated Boulder County, Erie, and Longmont are all experiencing population growth and associated residential and commercial development. Thus the exposure to the tornado hazard is growing in the County.

Wildfire

Existing Development

Wildfire has the potential to cause widespread damage and loss of life in Boulder County. The significance of this hazard and the availability of digital hazard data in GIS drove the development of a detailed vulnerability assessment that is discussed in the following pages.

Methodology

The HMPC used GIS to quantify the potential wildfire losses to the county and cities within the mapped wildfire hazard areas. The first step was to identify what is exposed to the wildfire hazard. This entailed overlaying a countywide GIS layer of the wildfire hazard on parcels that contained data on structures. The hazard layer utilized was completed in 2013 by the Boulder County Land Use Department as part of the Boulder County Wildfire Hazard Identification and Mitigation System. This layer was determined to be the best available wildfire hazard data countywide.

Boulder County's parcel layer was used as the basis for the inventory of developed parcels. GIS was used to create a centroid, or point, representing the center of each parcel polygon, upon which the wildfire layer was overlaid. In some cases, there are parcels in multiple wildfire hazard zones. For the purposes of this analysis, the wildfire hazard zone that intersected the centroid was assigned as the hazard zone for the entire parcel. Another assumption with this model is that every parcel with an improved value greater than zero was assumed to be developed in some way. Only improved parcels, and the value of those improvements, were analyzed and aggregated by property type and wildfire threat zone. Those parcels intersecting areas of moderate, high or very high hazard were analyzed and aggregated by fire districts and municipalities. The analysis was limited to the western Boulder County and the foothills communities of Nederland, Jamestown, Lyons, and Ward, where the majority of the moderate and higher fire hazards lie. Eastern Boulder County could experience grassland fires, particularly on Open Space parcels, which could impact developed areas adjacent to them, such as Louisville, Lafayette, and Superior.

The results of the analysis are displayed in Tables 4.34 & 4.35, displaying the value of residential structures and an estimated contents value (50 percent of the structure value). Based on this analysis, western Boulder County has significant assets at risk to wildfire. Total population at risk within this hazard group is 46,892. Population was estimated by applying the 2010 Census average household size of 2.39 to the count of residential structures affected. 19,620 residential parcels are within the very

high, high and moderate hazard zones, with a total value of \$9,814,756,070. Note that assessed values were separated out from the total assessed value so that losses to structures could be quantified. However, land value can decline following a large wildfire. This reduction in property value results in lower property taxes collected, and can significantly impact the County's tax revenue. Based on observations in wildland-urban interface fires, structures and contents are often completely destroyed, thus the estimated total value also represents potential dollar losses. Note: a wildfire is not likely to burn all the wildland-urban interface areas in Boulder County at once.

The population, structures, and value of structures affected are shown by fire district on maps in Figures 4.17. Detail of the wildfire hazard in and around the municipalities of Nederland, Jamestown, Lyons, and Ward, can be found in their respective community stories (located in Annex's A-L).

Table 4.34. Residential Structures and Population in Wildfire Zone 1 by Municipality

Municipality	Residential Structures in High Hazard	Structure Value	Content Value Estimate	Total Value	Total Pop.	At Risk Pop.	Percent of Total Pop.
Nederland	671	\$120,595,057	\$60,297,529	\$180,892,586	1,604	1,604	100.00%
Boulder	10,574	\$4,268,638,026	\$2,134,319,013	\$6,402,957,039	74,002	25,272	34.15%
Jamestown	133	\$27,736,700	\$13,868,350	\$41,605,050	318	318	100.00%
Lyons	876	\$236,767,719	\$118,383,860	\$355,151,579	2,094	2,094	100.00%
Ward	98	\$8,644,700	\$4,322,350	\$12,967,050	234	234	100.00%
Unincorporated (West)	7,268	\$1,880,788,511	\$940,394,256	\$2,821,182,767	18,097	17,371	95.98%
Total	19,620	\$6,543,170,713	\$3,271,585,357	\$9,814,756,070	126,357	46,892	37.11%

Table 4.35. Residential Structures and Population in Wildfire Zone 1 by Fire District

Fire District Name	Residential Structures in High Hazard	Structure Value	Content Value Estimate	Total Value	Total Pop.	At Risk Pop.	Percent of Total Pop.
Allenspark	1,174	\$208,754,200	\$104,377,100	\$313,131,300	2,806	2,806	100.00%
Boulder Mountain	975	\$442,541,252	\$221,270,626	\$663,811,878	2,330	2,330	100.00%
Boulder Rural	285	\$122,364,044	\$61,182,022	\$183,546,066	13,396	681	5.08%
City of Boulder	10,574	\$4,268,638,026	\$2,134,319,013	\$6,402,957,039	74,002	25,272	34.15%
Coal Creek	521	\$62,127,121	\$31,063,561	\$93,190,682	1,245	1,245	100.00%
Four Mile	318	\$76,101,095	\$38,050,548	\$114,151,643	760	760	100.00%
Gold Hill	189	\$38,014,619	\$19,007,310	\$57,021,929	452	452	100.00%
High Country	445	\$83,987,647	\$41,993,824	\$125,981,471	1,064	1,064	100.00%
Hygiene	18	\$4,578,200	\$2,289,100	\$6,867,300	2,772	43	1.55%
Indian Peaks	354	\$49,575,216	\$24,787,608	\$74,362,824	846	846	100.00%
Left Hand	703	\$207,800,673	\$103,900,337	\$311,701,010	1,833	1,680	91.66%

Lyons	1,244	\$354,258,584	\$177,129,292	\$531,387,876	2,988	2,973	99.52%
Nederland	1,455	\$243,695,158	\$121,847,579	\$365,542,737	3,477	3,477	100.00%
Rocky Mountain	445	\$119,204,429	\$59,602,215	\$178,806,644	13,845	1,064	7.68%
Sugarloaf	544	\$144,913,462	\$72,456,731	\$217,370,193	1,300	1,300	100.00%
Sunshine	125	\$57,323,003	\$28,661,502	\$85,984,505	299	299	100.00%
Town of Jamestown	133	\$27,736,700	\$13,868,350	\$41,605,050	318	318	100.00%
Total	19,502	6511613429	\$3,255,806,715	\$9,767,420,144	123,733	46,610	37.67%

Figure 4.17. Wildfire Risk by Fire District: Residential Structures

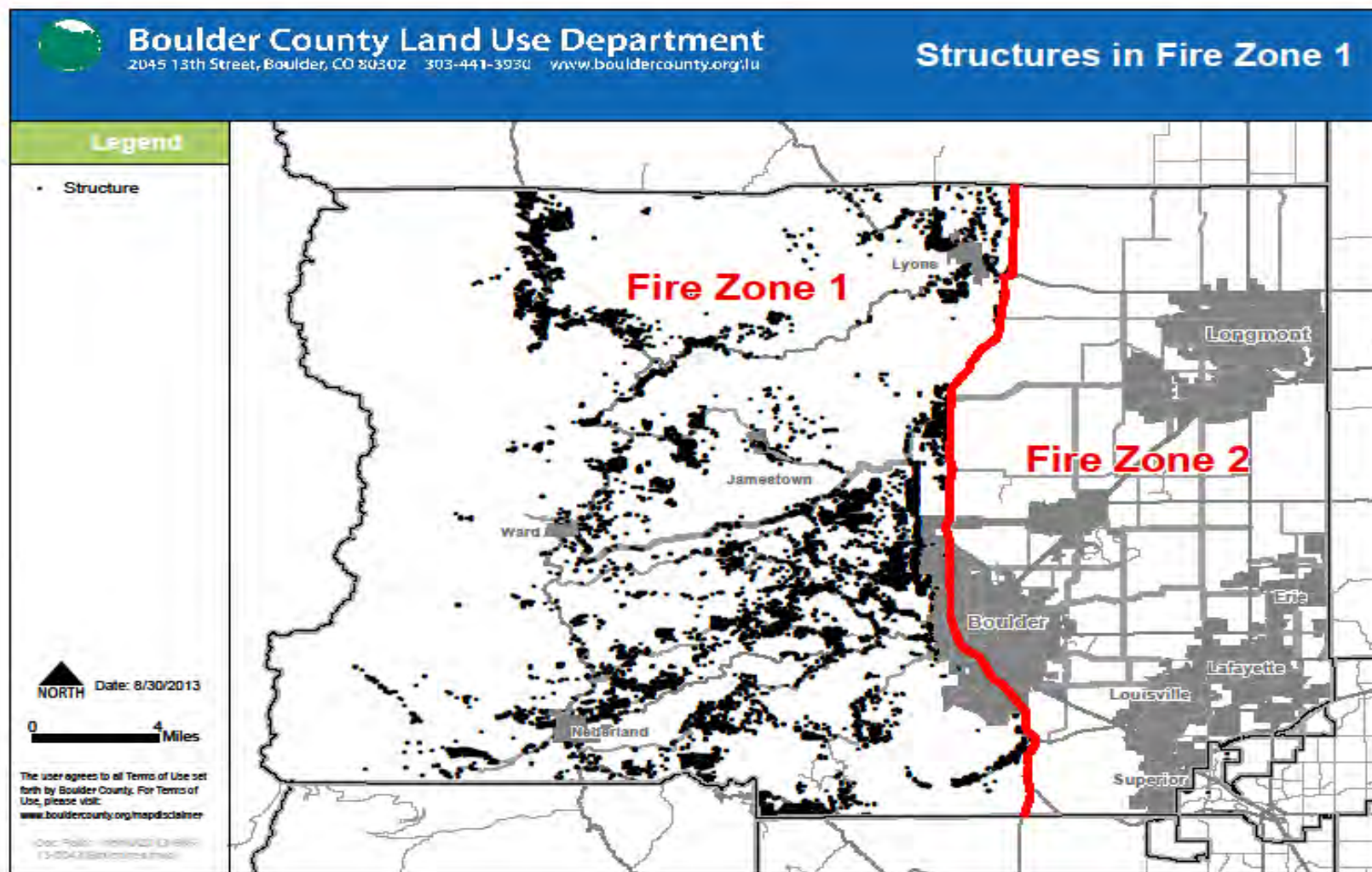
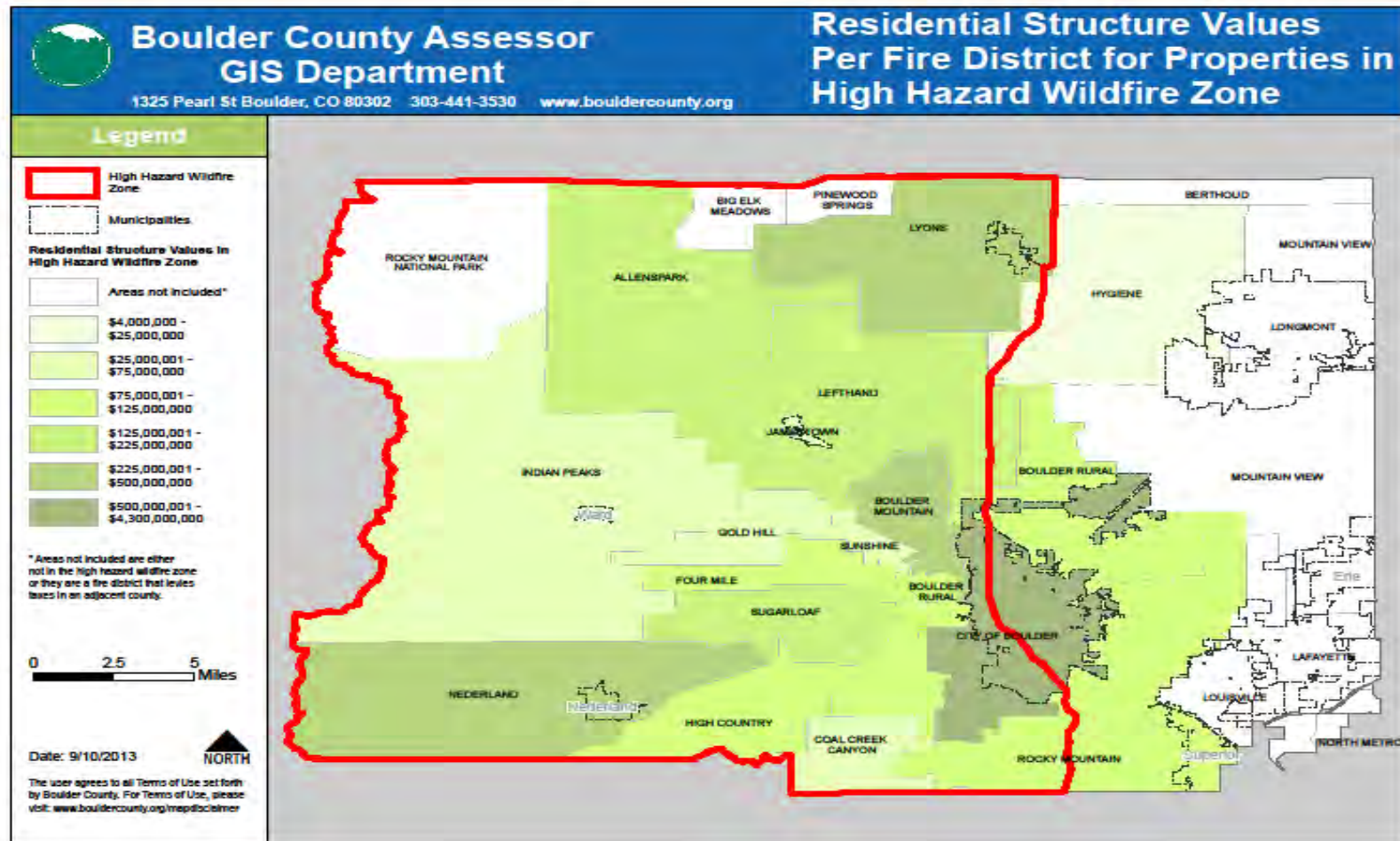


Figure 4.18. Wildfire Risk by Fire District: Structure Value



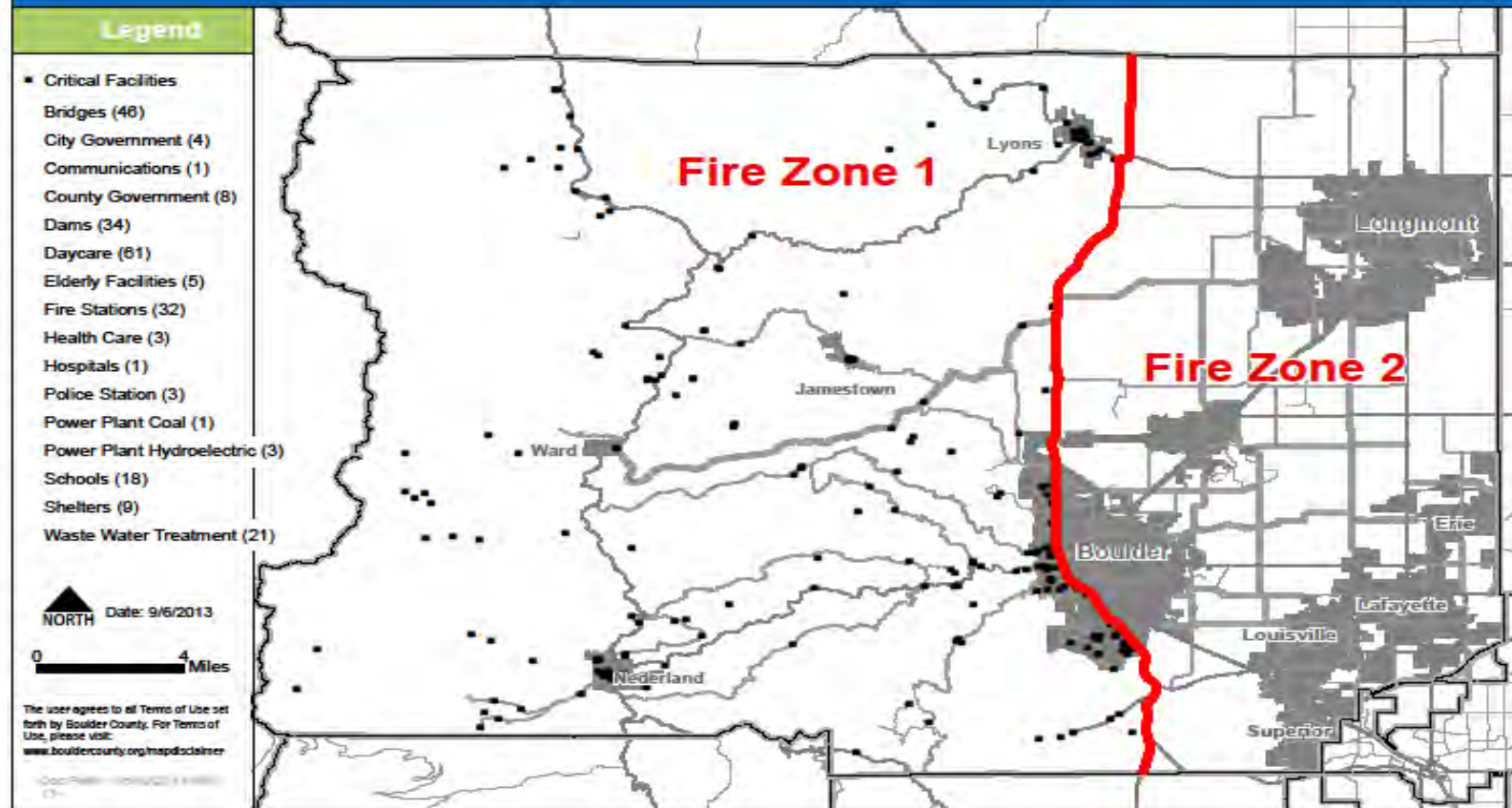
To estimate the potential impact of wildfires on critical facilities a GIS overlay was performed of the wildfire hazard layer on existing critical facilities point locations. The results are shown in Table 4.36. Bridges are included because wooden bridges could burn in a wildfire and result in a life safety issue both for evacuation and responders. A number of waste water treatment facilities are potentially at risk. No replacement values are available, so a further estimate of potential losses was not possible. The critical facility layers provided were the best available, but may not be complete, especially for the mountain towns. Nederland, Ward, Jamestown and Lyons more than likely have fire departments, water treatment plants, and government buildings but they were not represented in the available data.

Table 4.36 Critical Facilities Located in Wildfire Hazard Areas

Location	Facility Type	Facility Name	Wildfire Hazard
Lyons	Bridges	SH 7 ML	Very High
Lyons	Bridges	US 36 ML	Moderate
Unincorporated	Bridges	VALMONT ROAD	Very High
Unincorporated	Bridges	COUNTY ROAD 80	Very High
Unincorporated	Bridges	N 41ST ST (CR 59)	Very High
Unincorporated	Bridges	SH 170 ML	Very High
Unincorporated	Bridges	SH 170 ML	Very High
Unincorporated	Bridges	COUNTY ROAD 103	High Hazard
Unincorporated	Bridges	COUNTY ROAD 84S	High Hazard
Unincorporated	Bridges	COUNTY ROAD 103	High Hazard
Unincorporated	Bridges	COUNTY ROAD 103	High Hazard
Unincorporated	Bridges	COUNTY ROAD 124E	High Hazard
Unincorporated	Bridges	SH 72 ML	Moderate
Unincorporated	Bridges	COUNTY ROAD 96	Moderate
Unincorporated	Bridges	INTERLOCKEN LOOP	Moderate
Unincorporated	Bridges	SH 119 ML	Moderate
Unincorporated	Bridges	S BEAVER CK RD	Moderate
Unincorporated	Bridges	SH 7 ML	Moderate
Unincorporated	Bridges	INTERLOCKEN BLVD.	Moderate
Unincorporated	Bridges	COUNTY ROAD 84W	Moderate
Unincorporated	Bridges	COUNTY ROAD 80	Moderate
Unincorporated	Bridges	CHERRYVALE ROAD	Moderate

Location	Facility Type	Facility Name	Wildfire Hazard
Unincorporated	Bridges	SH 119 ML	Moderate
Unincorporated	Bridges	SH 119 ML	Moderate
Unincorporated	Bridges	ANDERSON WAY	Moderate
Unincorporated	Bridges	COUNTY ROAD 132	Moderate
Unincorporated	Bridges	COUNTY ROAD 124E	Moderate
Unincorporated	Bridges	COUNTY ROAD 116	Moderate
Unincorporated	Bridges	COUNTY ROAD 128E	Moderate
Unincorporated	Bridges	COUNTY ROAD 130	Moderate
Unincorporated	Communications	KRKS-FM CH 234	Moderate
Unincorporated	Fire Stations	Allenspark Fire Protection	Moderate
Jamestown	Schools	Jamestown Elementary	High Hazard
Unincorporated	Schools	Nederland Middle/Senior School	Moderate
Unincorporated	Shelters	Nederland Middle/Senior School	Moderate
Unincorporated	Waste Water Treatment	Gibson Bob & Bret	Very High
Unincorporated	Waste Water Treatment	Mueller Christopher and Heidi	Very High
Unincorporated	Waste Water Treatment	Lyons Town of	High Hazard
Unincorporated	Waste Water Treatment	Flatiron Paving Company of Boulder	Moderate
Unincorporated	Waste Water Treatment	Highlands Presbyterian Camp	Moderate
Unincorporated	Waste Water Treatment	Denver City and County	Moderate
Unincorporated	Water Treatment Facility	Pine Brook Water District	Moderate

Figure 4.37 Critical Facilities Located in Fire Zone 1



Future Development

Growth in the wildland urban interface has been significant in the past twenty years in Boulder County. While this growth has recently slowed, there still remains potential for development of primary and secondary residences in wildfire hazard areas in the unincorporated County. Wildfire risk to future development in these areas will be tempered by the County's land use regulations.

Critical Facilities Planning (CFP)

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. The 2009 Multi-Hazard Mitigation Plan (MHMP): <http://www.boulderoem.org/files/Multihazardplan.pdf> details the extensive process that was undertaken to determine the critical facilities potentially impacted by flooding in Boulder County. The process is described as follows (all page numbers refer to the pdf page number):

- Definition and examples of critical facilities in Boulder County on report pages 111 to 114,
- Maps of potentially flood affected critical facilities in Unincorporated Boulder County on Figures 4.33 and 4.34, pages 142 and 143, and
- A list of potentially flood impacted critical facilities in Boulder County on Table 4.38, page 158.

As part of preparation for the 2014 update to the MHMP, the analysis was repeated. For the 2014 MHMP, no additional facilities will be added to the list of critical facilities potentially impacted by flooding in Unincorporated Boulder County. The list of critical facilities from the 2009 MHMP is reproduced below:

Critical Facilities Potentially Impacted by Flooding (MHMP, 2009, p160)

Location	Facility Type	Facility Name	Flood Zone
Unincorporated	Communications	KVCU 1190	A
Unincorporated	Natural Gas Plant	Public Service Company Louisville Site	A
Unincorporated	Waste Water Treatment	Gibson Bob & Bret	A
Unincorporated	Waste Water Treatment	75 th Street Wastewater	X500

As part of preparation for this five-year CRS verification visit, and first-time submittal of documentation of Activity 610-CFP, the identified managers of each of the four listed critical facilities were contacted to determine if the listed facilities met the definition above of a 'critical facility'.

Facility	Person Contacted	Documentation	Comment	Critical?
KVCU 1190 Antenna	Stu Pike, Director, Emergency Management, Univ of CO	Email from Stu Pike attached	Antenna for University of CO Radio Station	No
Public Service Company (Xcel)		Email from __	Pipe access at edge of Warembourg Lafayette Open Space. Rarely accessed.	No
Bob & Bret Gibson Waste Water Treatment	Fourmile Fire District, Chief Bret Gibson	Phone conversation notes.	Septic System for Boulder Mountain Lodge. Septic destroyed by September 2013 flood and replaced. Minimal impact. Not critical.	No
75 th Street Wastewater Treatment Plant	City of Boulder Utilities, Safety and Compliance Officer, Felix Gallo	Attached response plans. (on in CRS documentation)	Has accredited levee. Still considered a critical facility that could be impacted by flooding.	Yes

75th Street Wastewater Plant:

Description:

The only critical facility located in Unincorporated Boulder County potentially impacted by flooding is the City of Boulder's 75th Street Wastewater Treatment Plant. It is located within the 100-year floodplain of Boulder Creek, and protected by a levee (Map attached in Appendix D). In 2012, the City of Boulder completed a levee maintenance project at the plant. On the DFIRM, the plant is shown as being protected by an accredited levee. Despite the accredited levee, because of the importance of the facility (it is the only wastewater facility for users of City of Boulder water), this plant is still considered a critical facility at risk of flooding.

Contact Information (CFP1):

Chris Douville, Wastewater Treatment Coordinator, Plant Manager, 303-413-7341.

Need for Special Warning (CFP1):

Conversation with Felix Gallo, City of Boulder Utilities, Safety and Compliance Officer, (303-441-3090, gallof@bouldercolorado.gov) confirms that the plant manager/shift supervisor, do not need special warning, because they carry pagers and cell phone and are alerted via 'AHA' (All Hazards Alert).

Flood Warning and Response Plan (CFP2)

The 75th St. Wastewater Plant has its own flood warning and response plan labeled 'Mode Sheets' and included in Appendix D.

621.e StormReady Community (SRC)

Unincorporated Boulder County is a StormReady community.

Windstorm

Existing Development

Based on the hazard profile in Section 4.2, windstorms will continue to cause property damage annually in Boulder County. Due to the random and widespread nature of the hazard it is difficult to estimate future losses and where they will occur. Based on the NCDC data alone (see the windstorm profile in Section 4) between 1994 and 2005 the average annualized loss from wind is in the vicinity of \$3.4 million. While that figure may include other losses from neighboring counties, it is likely to be a reasonable estimate. Communities in and along the base of the foothills are most susceptible to the hazard, including the city of Boulder, Louisville, Superior, Lyons, Jamestown, Nederland, and Ward, but high winds can damage communities in eastern Boulder County as well.

Windstorms can and will cause injury and even death in Boulder County. The highest risk demographic is to first responders who are dealing with emergency situations resulting from the windstorm. Those working or recreating outdoors will be susceptible to injury from wind borne debris. Winds can also be hazardous to hikers in areas of beetle or fire killed trees. This situation killed a hiker in Rocky Mountain National Park in 2007.

Impacts to critical facilities are difficult to estimate, but buildings could be susceptible to roof and window damage, as was witnessed at the Boulder County Jail in February of 1999. Backup power systems in critical facilities could help mitigate impacts from power outages associated with windstorms.

Future Development

Construction sites can be particularly vulnerable to windstorms. Wind borne construction materials can become hazards to life and property. New construction designed in accordance with the Boulder County wind load map should be able to withstand wind damage, if properly constructed.

Section 5: Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the Boulder County Multi-Hazard Mitigation Plan. This section describes how the County accomplished Phase 3 of FEMA's 4-phase guidance—Develop the Mitigation Plan.

Goals and Objectives

Up to this point in the planning process, the Hazard Mitigation Planning Committee (HMPC) has organized resources, assessed natural hazards and risks, and documented mitigation capabilities. A profile of the County's vulnerability to natural hazards resulted from this effort, which is documented in the preceding chapter. The resulting goals, objectives, and mitigation actions were developed based on this profile. In 2008, the HMPC developed this aspect of the plan based on a series of meetings and worksheets designed to achieve a collaborative mitigation planning effort as described further in this section. In the 2013 update, a second series of meetings and workshops was conducted to reevaluate and modify the goals of the plan as needed. The HMPC concluded that the goals previously identified were still valid and agreed to uphold them.

For the purpose of this mitigation plan, goals were defined as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals were defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. Thus, implementation cost, schedule, and means are not considered in the goal statements which form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable. The goals identified by the HMPC are listed as follows, with their objectives.

Goal 1: Reduce the loss of life and personal injuries from hazard events

- Continue to manage development in hazard-prone areas, including property acquisitions to remove development from hazardous locations, pursuing relocation/elevation actions for flood-impacted properties, and providing enforcement measures following disasters to insure that all redevelopment and recovery activities are in compliance with existing development codes
- Continue programs to further identify hazards including but not limited to, flood, erosion, wildfire, debris flows, rock fall, etc and assess risk associated.
- Provide timely notification and direction to the public of imminent and potential hazards, including installing rain gauges, soil saturation sensors and stream monitoring systems for early warning identification of pending flooding situations and debris flows.

Goal 2: Reduce impacts of hazard events on property, critical facilities/infrastructure, and the environment

- Continue to manage development and placement of structures in hazard-prone areas, , including applying land use regulations to minimize exposure to potential hazards and expanding current wildfire mitigation and defensible space programs (prescriptive, negotiated - e.g. Transfer of Development Rights (TDRs), Transfer of Development Credits (TDCs), conservation easements, purchase of development rights - and educational) on both public and private lands
- Protect existing property to the extent possible through regulations, codes, education, cooperative agreements, hazard reduction projects, and other means
- Protect critical facilities and infrastructure to minimize loss of critical services following a hazard event including installation of back-up generators and other vital infrastructure at critical county facilities
- Create incentives for the public to mitigate hazards on their own property through education, cooperative land acquisitions, Elevation and relocation programs, Community Wildfire Protection Plans, TDRs and TDCs, and other means as they become available or are created.
- Continue to reduce flood losses through compliance with National Flood Insurance Program requirements; continue to comply with Community Rating System requirements, where applicable (i.e., Boulder County, Longmont, and Louisville).

Goal 3: Strengthen intergovernmental coordination, communication, and capabilities in regard to mitigating hazard impacts

- Promote planning efforts that foster cooperation and coordination among jurisdictions, agencies, and organizations involved in hazard mitigation. Further integrate land use planning and mitigation planning efforts.
 - Maximize the use of shared resources between jurisdictions and special districts for mitigation purposes
 - Maintain and strengthen the Boulder County Multi-Agency Coordination System
- Establish and maintain processes and resources to incorporate mitigation into recovery efforts following a hazard event

Goal 4: Improve public awareness regarding hazard vulnerability and mitigation

- Enhance public education efforts regarding hazards and risk in Boulder County and the role of the public in mitigation
 - Continue involving the public in hazard mitigation planning and implementation
- Combine mitigation education efforts with existing governmental and nongovernmental outreach programs

Identification and Analysis of Mitigation Actions

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4: Identifying Hazards was evaluated. Only those hazards that pose a significant threat to the community were considered further in the development of hazard specific mitigation measures. In fact, the HMPC agreed to downgrade the significance of two hazards, specifically,

Pandemic flu and West Nile Virus. This was a result of the successful implementation of mitigation measures concerning them.

Once it was determined which hazards warranted the development of specific mitigation measures, the HMPC analyzed the previous set of viable mitigation options and alternatives identified in 2008. The status of those actions was categorized as completed, incomplete, ongoing, or not yet begun. Additional mitigation actions were then issued and are incorporated into this plan. Emergency Services

Mitigation Action Plan

This section outlines the development of the final mitigation action plan. The action plan consists of the specific projects, or actions, designed to meet the plan's goals. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan's goals.

Prioritization Process

Once all the mitigation actions were identified, the HMPC members were asked to rank as high, medium, or low their mitigation actions. Using the same methodology from 2008, the HMPC did so.

The final results from the HMPC are summarized below in Table 5.1. The actions are grouped by hazard. Appendix C contains more detail about the action, including a description of the activity, the entity responsible for implementation, any other alternatives considered, cost estimate, and a schedule for implementation.

Table 5.1 Mitigation Action Plan Summary from 2008 HMP

Mitigation Action Title	Jurisdiction	Priority
Multi-Hazard Actions		
Conduct All-Hazards Symposium	County and Municipalities	High
Expand County-wide Recruiting of Citizen Emergency Response Training (CERT)	County, Longmont	High
Improve Communication Interoperability Between and Among Public Safety Agencies, First Responders, and School Staff	County, St. Vrain and Boulder Valley School Districts	High
Implement Outdoor Emergency Warning System Enhancement Project	County, Erie, Louisville	High
Implement Emergency Email & Text Messaging Notification System in Erie	Erie	High
Develop Citizen Preparedness Guides to Distribute at Community Events	County and Municipalities	Medium
Develop and Distribute All-Hazards Education Materials to the Public in Louisville	Louisville	Medium
Create a Comprehensive Evacuation Route Signage System for County	County	Medium
Deliver CERT for Teens	County, St. Vrain and Boulder Valley School	Medium

Mitigation Action Title	Jurisdiction	Priority
	Districts	
Implement Architectural Improvements in Schools	Boulder Valley School District	Medium
Crisis Management Team Training for School Personnel	Boulder Valley School District	Medium
Readiness and Emergency Management in Schools Grant Planning and Database Development	St. Vrain School District	Medium
Seek grant funding to install generators on critical County facilities	County	High
Disaster and Shelter in Place Medical Supplies/Materials for Schools	Boulder Valley School District	Medium
Purchase Development Rights/Conservation Easements or entire parcel from High Hazard Properties	County	High
Integration of Land Use and Mitigation Plans	County	Medium
Establish Emergency Shelter Centers in the City of Lafayette	Lafayette	Low
Flood Actions		
Acquire Flood damaged properties through Hazard Mitigation Grant Program and Community Development Block Grant Disaster Relief.		
Program for long term flood avoidance through acquisition of flood risk properties.		
Seek grant funding to implement elevation of structures	Boulder County, Lyons, Jamestown	High
Continue to Implement Sound Floodplain Management Practices as Communities Participating in the National Flood Insurance Program	County and Municipalities	High
Replace Bridge on N. 61 st St. over Boulder Creek	County	High
Develop Flood Protection for the Lyons Waste Water Treatment Plant	Lyons	High
Replace Bridge on N. 95th St. over Boulder Creek	County	Medium
Develop Comprehensive Flood Protection for the City of Boulder Wastewater Treatment Plant	County, City of Boulder	Medium
Improve Storm Drain Conveyance in Lyons	Lyons	Medium
Perform Channel Improvements and Replace Culvert on Little James Creek	Jamestown	Medium
Acquire Flood Prone Properties Through the Superior Floodplain Acquisition Program	Superior	Medium
Replace Bridge on N. 63rd St. over Left-Hand Creek	County	Low
Include Stormwater Control Projects at New School Construction Sites	School Districts	Low
Landslide / Mud and Debris Flow / Rockfall Actions		
Acquisition of properties damaged in the September 2013 Rain and flood event through CDBG-DR and other available grant programs		
	County, Jamestown, Lyons	High
Install Drainage Improvements to Skunk Tunnel Road	Jamestown	Low
Pandemic Flu/West Nile Actions		
Implement a Comprehensive Regional Medical Surveillance System for Early Identification of Threats to Public Health	County	Low
Wildfire Actions		
Develop Community Wildfire Protection Plan for Lyons	Lyons	High
Partner with Watershed Districts and USFS on Fuel Break Projects on Large Publicly Owned Tracts of Land in Western Boulder County	County	Medium
Create Community Fuel Breaks	County	Medium
Develop water system loop and install additional fire hydrants in Lyons	Lyons	Medium

Mitigation Action Title	Jurisdiction	Priority
Implement Wildfire Mitigation in the Louisville Urban Wildland Interface	Louisville, County	Medium
Create Fuel Breaks Along Roadways	County	Low
Continue Forest Restoration Projects to Minimize Wildfire Intensity	County	Low
Lower Sunshine Canyon Fuels Mitigation	County	Low
Develop Wildfire Information Kiosks and Wildfire Danger Signage	County, Fire Districts	Low

Table 5.2 Mitigation Action Plan Summary 2014 HMP

Mitigation Action Title	Jurisdiction	Priority
Multi-Hazard Actions		
Boulder County		
Mechanical Treatment of Boulder County Parks and Open Space Forests	Boulder County Parks & Open Space	High
Restoration of Fire as an Ecological Process within Boulder County Parks and Open Space Forest	Boulder County Sheriff & Parks and Open Space	NA
Fire Management within the Boulder County Parks and Open Space (BCPOS) System	Boulder County Sheriff & Parks and Open Space	Medium
Landscape Restoration and Climate Change Adaptation	Boulder County Parks & Open Space	
Research and Monitoring the Health and Resiliency of Boulder County Parks and Open Space (POS) Forest and the impact of POS Management	Boulder County Parks & Open Space	NA
Boulder County Community Forestry Sort Yards	Boulder County Parks & Open Space	NA
Boulder County Youth Corps Forestry and Fire Projects	Boulder County Parks & Open Space	NA
Boulder County Wildfire Mitigation Requirements for New Homes and Remodels		NA
Boulder County Wildfire Partners and Defensible Space	Boulder County Land-Use	
Boulder County Wildfire Partners and Grinder	Boulder County Land-Use	NA
Boulder County Forest Health Education and Outreach Program	Boulder County Land-Use	NA
October Wildfire Awareness Month	Boulder County Land-Use	High
Boulder County Community Chipping Program	Boulder County Land-Use	High
Saws and Slaws	Boulder County Land-Use	High
Firewise Communities	Boulder County Land-Use	
Property Acquisition	Boulder County Land Use	High
Elevation of Flood-prone structures	Boulder County Land Use	High
Replace Bridge on N. 61 st St. over Boulder Creek	Boulder County Transportation	High
Replace Bridge on N. 95th St. over Boulder Creek	Boulder County Transportation	Medium
Replace Bridge on N. 63rd St. over Left-Hand Creek	Boulder County Transportation	Low
Public Warning Plan Annex for EOP	Boulder OEM	High
Continue involvement in Climate Adaptation Planning Process	Boulder OEM / BOCC	Medium
Community Hazards Education and Preparedness Plan	Boulder OEM	Medium

Landslide Early Warning Capability	Boulder OEM	High
Flood Control District in non-UDFCD covered areas	Boulder County / BOEM	High
Integration of Land Use and Mitigation Plans	Boulder OEM and Boulder County Land Use	Medium
Install Generators at Critical County Facilities	Boulder County Admin Services	High
Strategic Continuity, Response, and Recovery Plan	Boulder County Departments and Offices	High
BOCO Strong Regional Resiliency Plan (add Garry's CDBG-dr request)		
Update Floodplain program including maps, text and outreach	Boulder County Transportation	High
Town of Erie		
Implement Emergency email and txt messaging notification system in ERIE	Town of Erie - Administration	NA
Continue to implement sound floodplain management practices as communities participating in the NFIP	Town of Erie - DPW	High
Install additional Outdoor Warning Sirens at new MVFR stations to be built starting 2015.	- Town of Erie - MVFR	High
Emergency Generator for Town Hall	Town of Erie - DPW	High
Coal Creek Trail Improvements	Town of Erie - DPW	Medium
Boulder Creek Trail Improvements	Town of Erie - DPW	Medium
Portable Radio Kit	Town of Erie P.D.	High
Town of Jamestown		
Continue to implement sound floodplain management practices as a community participating in the NFIP and CRS	Jamestown's Mayor's Office	
Perform channel improvements and replace culvert on Little James creek	Town of Jamestown/NRCS/EPA	
Install drainage improvements to skunk tunnel road	Town of Jamestown	Low
Rain Gauge	Town of Jamestown	High
Dwelling Elevations	Town of Jamestown/HMGP	High
Andersen Hill Bridge	Town of Jamestown	
Lower Main St. Bridge	Town of Jamestown	Low
Property Acquisitions	Town of Jamestown	High
Gillespie Gulch Culvert	Town of Jamestown	High
City of Lafayette		
Establish emergency shelter centers in the city of Lafayette	City of Lafayette	Low
Continue to implement sound floodplain management practices as communities participating in the NFIP	City of Lafayette	High
Replace Emergency Outdoor Warning Sirens	City of Lafayette	High
City of Longmont		
Continue to implement sound floodplain management practices as communities participating in the NFIP		High
CERT		Medium

Fire Mitigation at Buttonrock		High
City of Longmont Wastewater Treatment Plant Flood Protection		
St. Vrain Creek Improvement Project		
South St. Vrain Pipeline Flood Repair		
Pressurization of the South St. Vrain Pipeline		
North Pipeline Reconstruction to minimize future flood damage		
St. Vrain Creek Overflow Channel west of City - Golden Property, Heron Lake Channel		
National Flood Insurance Program Community Rating System (CRS)		
Airport Road Flood Protection Project (Western Boundary Flood Protection Project)		
City of Lyons		
Develop community wildfire protection plan for Lyons		
Continue to implement sound floodplain management practices as communities participating in the NFIP		High
Develop flood protection for the Lyons wastewater treatment plan		High
Improve storm drain conveyance in Lyons		High
Develop water system loop and install additional fire hydrants in Lyons		Medium/High
Town needs own Safe Site and Community Meeting Center for Emergency Planning, Meeting, Shelter, Medicine, Food, Clothing, Emergency Equipment Storage and Delivery, and Ham Radio Operations Base		Medium
Town of Gold Hill		
Town needs own Safe Site and Community Meeting Center for Emergency Planning, Meeting, Shelter, Medicine, Food, Clothing, Emergency Equipment Storage and Delivery, and Ham Radio Operations Base		High
Fourmile FPD		
Create defensible space around 140 structures along the main corridor of our district and to treat 150 acres of contiguous hazardous fuels along this same corridor, totaling 364 acres.		High
Objective is to ensure uninterrupted communications and functionality of our fire protection district's primary fire station and command center.		High
Lefthand FPD		
Remove standing hazard snag trees from the canyon roadways		High
Sunshine FPD		
Project goal is to provide automatic, standby generators at each of Sunshine FPD's two fire stations. The generators will be sized to provide power to all critical electrical components with load shedding provided as needed to shutoff non-critical electrical loads.		High
Post-flood watershed master plans		High

Section 6: Plan Adoption

The purpose of formally adopting this plan is to secure buy-in from Boulder County and participating jurisdictions, raise awareness of the plan, and formalize the plan's implementation. This section is part one in part how the County accomplished Phase 4 of FEMA's 4-phase guidance—Implement the Plan and Monitor Progress. Chapter 7: Plan Implementation and Maintenance is part two and will conclude the remainder of Phase 4. The governing board for each participating jurisdiction will need to adopt this local hazard mitigation plan by passing a resolution. A copy of the generic resolution and the executed copies are included in Appendix A Plan Adoption. The date on which each jurisdiction adopts this plan will be entered below.

NOTE TO STATE and FEMA REVIEWERS: This plan will be formally adopted following FEMA, Colorado Division of Emergency Management and Colorado Water Conservation Board review and approval of plan.

Boulder County Board of County Commissioners	_____
	MM/DD/YYYY
Erie Town Council	_____
	MM/DD/YYYY
Gold Hill Town Council	_____
	MM/DD/YYYY
Jamestown Town Council	_____
	MM/DD/YYYY
Lafayette City Council	_____
	MM/DD/YYYY
Longmont City Council	_____
	MM/DD/YYYY
Louisville City Council	_____
	MM/DD/YYYY
Lyons Town Council	_____
	MM/DD/YYYY
Nederland Town Council	_____
	MM/DD/YYYY
Superior Town Council	_____
	MM/DD/YYYY
Ward Town Council	_____
	MM/DD/YYYY
Boulder Valley School District Board of Education	_____
	MM/DD/YYYY
St. Vrain Valley School District Board of Education	_____
	MM/DD/YYYY
Fourmile Fire Protection District	_____
	MM/DD/YYYY
Lefthand Fire Protection District	_____
	MM/DD/YYYY
Sunshine Fire Protection District	_____
	MM/DD/YYYY

Section 7: Plan Implementation and Maintenance

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This chapter outlines how this plan will be implemented and updated and is the final conclusion of Phase 4 of FEMA's 4-phase guidance—Implement the Plan and Monitor Progress.

Implementation

Once adopted, the plan faces the truest test of its worth: implementation. While this plan contains many worthwhile projects, the HMPC will need to decide which action(s) to undertake first. Two factors will help with making that decision. First, the priority assigned the actions in the planning process and funding availability. Second, Low or no-cost projects most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see Appendix C Actions) and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits of each project to the Boulder community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. The three main components of implementation are:

IMPLEMENT the action plan recommendations of this plan;
UTILIZE existing rules, regulations, policies and procedures already in existence; and
COMMUNICATE the hazard information collected and analyzed through this planning process so that the community better understands what can happen where, and what they can do themselves to be better prepared. Also, publicize the “success stories” that are achieved through the HMPC's ongoing efforts.

Simultaneously to the above mentioned efforts, the HMPC will constantly monitor funding opportunities that could be leveraged to implement some of the more costly actions. This will include creating and maintaining a bank of ideas on how to meet required local match or participation requirements. When funding does become available, the HMPC will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

Role of Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the Hazard Mitigation Planning Committee (HMPC) will be tasked with plan implementation and maintenance. The HMPC will be led by the Boulder Office of Emergency Management (OEM). The HMPC will act as an advisory body. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. The HMPC agrees to:

Act as a forum for hazard mitigation issues;
Disseminate hazard mitigation ideas and activities to all participants;

Pursue the implementation of high-priority, low/no-cost recommended actions;
Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
Monitor and assist in implementation and update of this plan;
Report on plan progress and recommended changes to the Boulder Board of County Commissioners;
and
Inform and solicit input from the public.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website and local newspapers.

Maintenance/Monitoring

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

Maintenance/Monitoring Schedule

In order to track progress and update the mitigation strategies identified in the action plan, the HMPC will revisit this plan annually or after a significant hazard event or disaster declaration. Boulder OEM is responsible for initiating this review and convening members of the HMPC on a once yearly basis, or more frequently as needed. The annual review will be held in February, prior to the traditional flood and wildfire season.

In addition to the annual review, this plan will be updated, approved and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000. When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. With the initial approval of this plan occurring in October 2017, the plan will need to be updated, re-approved by the Colorado Division of Emergency Management (CDEM) and FEMA Region VIII and re-adopted by all participating jurisdictions by no later than October of 2018. The County maintains the options of submitting a Pre-Disaster Mitigation planning grant application to the Colorado Division of Emergency Management (CDEM)/FEMA for funds to assist with the update. This grant should be submitted in 2015, as there is a three year performance period to expend the funds, plus there is no guarantee that the grant will be awarded when initially submitted. This allows time to resubmit the grant in 2016 or 2017 if needed. Updates to this plan will follow the most current FEMA and CDEM planning guidance.

Maintenance Evaluation Process

Updates to this plan will follow the latest FEMA and CDEM planning guidance. Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

Decreased vulnerability as a result of implementing recommended actions,
Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
Increased vulnerability as a result of new development (and/or annexation).

The HMPC will use the following process to evaluate progress and any changes in vulnerability as a result of plan implementation:

A representative from the responsible entity identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the HMPC on project status and provide input on whether the project as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.

If the project does not meet identified objectives, the HMPC will determine what alternate projects may be implemented.

New projects identified will require an individual assigned to be responsible for defining the project scope, implementing the project, and monitoring success of the project.

Projects that were not ranked high priority but were identified as potential mitigation strategies will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation.

Changes will be made to the plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

Updates to this plan will:

Consider changes in vulnerability due to project implementation,
Document success stories where mitigation efforts have proven effective,
Document areas where mitigation actions were not effective,
Document any new hazards or increased hazard risk that may arise or were previously overlooked,
Document hazard events and impacts that occurred within the five-year period,
Incorporate new data or studies on hazards and risks,
Incorporate new capabilities or changes in capabilities,
Incorporate documentation of continued public involvement,
Incorporate documentation to update the planning process that may include new or additional stakeholder involvement,
Incorporate growth and development-related changes to building inventories,
Incorporate new project recommendations or changes in project prioritization,
Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to CDEM/FEMA, and
Include re-adoption by all participating entities following COEM/FEMA approval.

Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other County and City plans and mechanisms. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. Implementation through existing plans and/or programs is recommended, where possible. The County and participating entities already have existing policies and programs to reduce losses to life and property from natural hazards. These are summarized in this plan's capability assessment. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing projects, where possible, through these other program mechanisms. These existing mechanisms include:

- Boulder County Comprehensive Plan
- Boulder County Land Use Code
- Boulder County Capital Improvements Plan
- Boulder Emergency Operations Plan
- Boulder Multiple Agency Coordinating System
- Lafayette Comprehensive Plan
- Lafayette Code of Ordinances
- Longmont Area Comprehensive Plan
- Longmont Water Supply and Drought Management Plan
- Longmont Water Conservation Draft Master Plan
- City of Louisville Comprehensive Plan
- Louisville Municipal Code
- Town of Lyons Comprehensive Plan
- Lyons Municipal Code
- Town of Superior Comprehensive Plan
- Superior Municipal Code
- Boulder Valley School District Educational Facilities Master Plan
- St. Vrain Valley School District Comprehensive Facility Plan

HMPC members involved in the updates to these mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, as appropriate. Examples would be the Boulder Climate Adaptation Plan or the Boulder Community Wildfire Plan, and specifically linking duties of these types of plans with this plan.

Continued Public Involvement

Continued public involvement is also imperative to the overall success of this plan's implementation. The update process provides an opportunity to publicize success stories from the plan implementation and seek additional public comment. A public engagement process to receive public comment on plan maintenance and updating will be held during the next update period. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, and press releases to local media.

SOCIAL MEDIA STRATEGY

Introduction:

As with any civic effort, the process to revise and update the Boulder Multi-Hazard Mitigation Plan will benefit from broad public participation. The Boulder Office of Emergency Management will launch a *virtual* planning process to engage the community using social media and broaden the dialogue to include those members of our communities that, in the past, have been underrepresented in the planning process.

Goals:

- Raise community awareness of the Boulder County Multi-Hazard Mitigation Plan revision process.
- Increase public participation in the revision process resulting in an increase the incorporation of public input and comments into the development of the Multi-Hazard Mitigation Plan.
- Increase engagement between the public and the Boulder Office of Emergency Management.
- Build relationships between the Boulder Office of Emergency Management and target audiences.

Target Audiences:

All residents of Boulder County are our audience. However, to reach as broad an audience as possible we will actively engage several target audiences that can assist in pushing our message out to their constituencies and all residents of Boulder County.

- “Opinion leaders” (local journalists and traditional media, social media sites and the blogosphere, political/social activists)
- Business leaders (business owners, trade groups)
- Community organizations and leaders (churches, service clubs, chamber of commerce)
- Civic organizations and leaders that regularly engage with target constituencies (elected and government officials, schools and universities, service agencies)

Platforms:

The Boulder Office of Emergency Management already maintains a presence on the following platforms. A separate Facebook page dedicated to the MHMP will be established. It will serve as the main platform for engagement and traffic will be directed there via the OEM website, twitter, and the general Facebook page.

- Facebook
- Twitter
- YouTube

We may utilize other platforms if we determine a need or potential benefit.

Strategies:

- Target social media outreach to key “opinion leaders” to familiarize this group with the MHMP revision process and our goals of increasing public awareness and participation. Encourage this group to push our message through their outlets (re-tweets, link our site to their pages, shares on Facebook, etc). This could have an added benefit of generating earned media if news sites, papers, radio, and TV pick up the content which will also reach our target audiences.
- Develop content aimed at interests of specific target audiences, i.e. “why small businesses in Boulder should participate in the MHMP revision process” etc. Push this content through key contacts in our target audiences.
- Engage target audiences through an active online presence (aggressively monitor social media sites, participate in online forums/conversations, share relevant content online).

Tactics:**Increase our number of followers:**

- Include links to OEM social media sites on all electronic correspondence, press releases, and on our static web presence with a tag line.
- “Like” and “Follow” key members of our target audiences, this encourages them to “Like” and “Follow” us.
- Comment on, reply to, link to, and re-tweet relevant content generated by key target audience members. This helps establish our presence and encourages them to follow us.

Engage Target Audiences

- Adopt the 70/20/10 rule:
 - 70% of the content we push will be information of significant interest and value to our target audiences (articles & stories that communicate our message of the value of the MHMP and its revision process and the importance of public participation)
 - 20% of the content we push will be through online interaction/conversation with our target audiences. Many people now expect to interact with organizations this way, relationships are built online. (Respond to and converse with commenters in a way that addresses their needs and communicates our message)
 - 10% of our content can be blatant promotion i.e. “Like us on Facebook!” or “Comment on the MHMP today!”.

Observe and analyze social media activity

- Observation should guide any changes in the overall social media strategy

- Keep basic records on who is talking about the OEM and the MHMP? What are they saying? Which platforms are they using? What content resonates generates interest and reaction? Have any new “opinion leaders” emerged with whom we should engage?
- Is our content/message pushing beyond our circles? i.e. have we generated any earned media?

Evaluation and Measures

- To measure the impact of our social media presence we will track the following metrics:
 - Number of comments per week
 - Number of followers on Twitter
 - Number of “Likes” on Facebook
 - Number of re-tweets
 - Number of click throughs on links posted on Twitter, Facebook, and other sites
- Compare levels of social media participation to levels of public participation in original MHMP planning process and traditional public meetings.
- Compare the quality of participation in virtual and traditional public participation using the following metrics:
 - Number of questions/comments per participant
 - Length and/or complexity of questions/comments
 - Length and/or complexity of discussion, i.e. number of follow up questions, number of back and forth with staff and public, number of additional outside comments/questions generated by the original
 - Satisfaction of staff and public that interaction was valuable and productive: this may require a survey at the conclusion of the process

Social Media Data

Boulder Natural Hazard Mitigation Plan Revision Survey

Please select the jurisdictions in which you live and/or work (select all that apply).		
Answer Options	Response Percent	Response Count
City of Boulder	39.3%	92
Town of Erie	15.4%	36
Town of Jamestown	6.4%	15
City of Lafayette	17.1%	40
City of Longmont	7.3%	17
City of Louisville	6.8%	16
Town of Lyons	4.3%	10
Town of Nederland	5.1%	12
Town of Superior	2.1%	5
Town of Ward	1.3%	3
Allenspark	2.6%	6

Caribou	0.4%	1
Coal Creek	0.9%	2
Eldora	0.4%	1
Eldorado Springs	0.4%	1
Gold Hill	2.1%	5
Gunbarrel	4.7%	11
Hygiene	0.4%	1
Niwot	2.6%	6
Unincorporated Boulder County	24.8%	58
Other (please specify)		15
<i>answered question</i>		234
<i>skipped question</i>		0

Boulder Natural Hazard Mitigation Plan Revision Survey

Are you aware of the Boulder County Multi-Hazard Mitigation Plan developed in 2008?		
Answer Options	Response Percent	Response Count
Yes	35.9%	83
No	64.1%	148
<i>answered question</i>		231
<i>skipped question</i>		3

Boulder Natural Hazard Mitigation Plan Revision Survey

Did you participate in the development of the 2008 Boulder County Multi-Hazard Mitigation plan in any way?		
Answer Options	Response Percent	Response Count
Yes, I was a member of the Hazard Mitigation Planning Committee	1.3%	3
Yes, I attended a public meeting	3.0%	7
Yes, I provided comments on the Draft Plan	2.1%	5
No, I did not participate but I was aware of the plan and followed the development through news media	13.3%	31
No, I did not participate in any way	81.1%	189
<i>answered question</i>		233
<i>skipped question</i>		1

Boulder Natural Hazard Mitigation Plan Revision Survey

Below is a list of hazards the Boulder County Multi-Hazard Mitigation Plan currently addresses. Please select the 3 hazards of most concern to you:

Answer Options	Response Percent	Response Count
Avalanche	1.0%	2
Dam and Levee Failure	10.3%	20
Drought	42.8%	83
Earthquake	2.1%	4
Expansive Soils	3.6%	7
Extreme Temperatures	9.3%	18
Flood	44.3%	86
Hailstorm	11.3%	22
Landslide/Mud and Debris Flow/Rockfall	7.2%	14
Lightening	17.0%	33
Pandemic Flu	7.2%	14
Severe Winter Storm	29.4%	57
Subsidence	3.6%	7
Tornado	18.0%	35
West Nile Virus	17.0%	33
Wildfire	61.3%	119
Windstorm	14.4%	28
<i>answered question</i>		194
<i>skipped question</i>		40

Boulder Natural Hazard Mitigation Plan Revision Survey

Are there any hazards not listed in Question 5 that you believe the Hazard Mitigation Planning Committee should consider?

Answer Options	Response Percent	Response Count
Yes	20.0%	37
No	80.0%	148
<i>answered question</i>		185
<i>skipped question</i>		49

Boulder Natural Hazard Mitigation Plan Revision Survey

If you answered YES to Question 6, what additional hazards do you believe the Hazard Mitigation Planning Committee should consider?

Answer Options	Response Count
	43
<i>answered question</i>	43

<i>skipped question</i>	191

The predominate hazards respondents identified related to oil / gas activity including fracking, production and emissions. In addition, climate change, power grid failure and also hazards identified in the plan already such as tornado, fire, flood and drought.

Boulder Natural Hazard Mitigation Plan Revision Survey

Of all the hazards you have identified in Question 5 and Question 7 which do you consider to be the greatest threat to you and your community?

Answer Options	Response Count
	194
<i>answered question</i>	194
<i>skipped question</i>	40

The greatest hazards identified in the 194 responses were fire, flood, tornado, drought and landslides.

Boulder Natural Hazard Mitigation Plan Revision Survey

If the hazard you identified in Question 8 as being the greatest threat to you and your community occurred in your neighborhood today, what would be the likely impact to you and your family?

Answer Options	Response Count
	171
<i>answered question</i>	171
<i>skipped question</i>	63

Out of the 171 respondents loss of homes and property dominated the responses.

Boulder Natural Hazard Mitigation Plan Revision Survey

In the past 5 years, have you or any local organizations in your community taken any actions to reduce or eliminate the impact of this hazard?

Answer Options	Response Percent	Response Count
Yes	66.0%	128
No	34.0%	66
<i>answered question</i>		194
<i>skipped question</i>		40

Boulder Natural Hazard Mitigation Plan Revision Survey

If you answered YES to Question 10, please describe the actions you or your community have taken to reduce or eliminate the impact

of this hazard.

Answer Options	Response Count
	128
<i>answered question</i>	128
<i>skipped question</i>	106

Respondents reported that fire mitigation, community preparedness, flood mitigation, and spraying for west nile were the common themes of this question.

Boulder Natural Hazard Mitigation Plan Revision Survey

What actions do you believe your local government or Boulder County can take to help reduce or eliminate the impact of these hazards?

Answer Options	Response Count
	194
<i>answered question</i>	194
<i>skipped question</i>	40

Respondents were diverse in responses and a review of the survey by community is necessary to capture community recommendations.

Boulder Natural Hazard Mitigation Plan Revision Survey

Are there any other comments, questions, or concerns you would like the Hazard Mitigation Planning Committee to consider?

Answer Options	Response Count
	66
<i>answered question</i>	66
<i>skipped question</i>	168

Respondents highlighted continued mitigation efforts relating to flood and wildfire mitigation actions. Also reported in significant quantity was the need for additional sirens and community education related hazards.

Survey access is located on the BoulderOem.com website for detailed analysis by communities.

- Survey: <http://www.surveymonkey.com/s/BoulderHazardsSurvey> <http://svy.mk/10X3RPR>

Appendices

Appendix A Hazard Mitigation Planning Committee

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Stacy Davis St. Vrain Valley Schools 395 S. Pratt Pkwy. Longmont, CO 80503 Davis_stacy@svvsd.org 303-682-7311	Dea Wheeler Sheriff Attorney 303-441-1169 Dwheeler@bouldercounty.org	Fred Diehl Assistant to the Town Administrator Town of Erie 645 Holbrook Street P.O. Box 750 Erie, CO 80516 Phone: 303-926-2764 Fax: 303- 926-2706 fdiehl@erieco.gov www.erieco.gov
Tammi Matthews Community Services 303-441-4711 tmatthews@bouldercounty.org	Marilyn Gally Colorado Division of Homeland Security and Emergency Management Recovery and Mitigation Section, Emergency Management Branch 9195 E. Mineral Avenue, Suite 200, Centennial, CO 80112 (P) 720-852-6694 (F) 720-852-6750 http://dhsem.state.co.us	Stacey Proctor Project Manager BOULDER COUNTY TRANSPORTATION DEPARTMENT Comprehensive Creek Planning Initiative Office: 303-441-1107 sproctor@bouldercounty.org www.BoulderCountyCreekPlan.org
George Gerstel Boulder County Transportation Director 303-441-3955 ggerstle@bouldercounty.org	Joe Malinowski Public Health Division Manager 303-441-1197 3450 Broadway Boulder, CO 80304 jmalinowski@bouldercounty.org	Bret Gibson Fire Chief, Fourmile FPD 303-545-2337 chiefbret@gmail.com
Dan Eamon City of Longmont Emergency Manager 225 Kimbark Longmont, CO dan.eamon@ci.longmont.co.us	Francesca Gonzales LET II Boulder OEM 303-441-3390 fgonzales@bouldercounty.org	Braddock, Cynthia Assessors Office Bus: (303) 441-3688 E-mail: cbraddock@bouldercounty.org

303-651-8433		
John Benson Boulder Mountain Fire Protection District, Fire Chief 303-817-5156 chief@bouldermountainfire.org	Gerry Morrell Fire Chief City of Lafayette 401 N. 111th St., P.O. Box 68 Lafayette, CO gerrym@cityoflafayette.com 303-665-9661	Mike Thomas Boulder County Transportation Department 2045 13th St. Boulder, CO 80302 mthomas@bouldercounty.org 720-564-2655
Kevin Stewart Urban Drainage Flood Control District Bus: (303) 455-6277 Mobile: (720) 560-3980 E-mail: kstewart@udfcd.org	Lisa Widdekind Boulder County Mental Health Bus: (303) 413-7562 Mobile: (303) 944-8857 Bus Fax: (303) 413-7526 E-mail: Widdekind, Lisa	Pike, Stuart CU Boulder Emergency Manager Bus: no phone number listed Mobile: (720) 810-0885 E-mail: stuart.pike@colorado.edu E-mail 2: stuart.pike@colorado.edu
Roberts, Jerry Boulder County Assessor Bus: (303) 441-3533 E-mail: jroberts@bouldercounty.org	Schoedinger, Tara Mayor Town of Jamestown Bus: (303) 731-9269 E-mail: mayor@jamestownco.org	Schoolmeesters, Ryan Colorado Dam Engineers Bus: 303-866-3581 x 8284 Mobile: 303-842-1424 E-mail: ryan.schoolmeesters@state.co.us
Simonsen, Victoria Town Administrator Lyons E-mail: vsimonsen@townoflyons.com	Vasquez, Marco Erie Police Chief Bus: (303) 926-2811 Mobile: (303) 901-5164 Bus Fax: (303) 901-5164 E-mail: mvasquez@erieco.gov	Webster, James B. Boulder County Land Use Mobile: (720) 564-2600 E-mail: Webster, James B.
Wilderma, Chris Boulder Valley Schools Mobile: (720) 972-3803	Amy E. Hardy Mountain Resource Coordinator Foothills United Way 1285 Cimarron Drive Lafayette, CO 80026 Phone: 303-895-3418 ahardy@unitedwayfoothills.org unitedwayfoothills.org	Hayes, Dave Bus: 303-859-1209 Louisville Police Chief
Peter C. Perez Emergency Management Analyst City of Longmont Office of Emergency Management Department of Public Safety 225 Kimbark Street ▪ Longmont, Colorado 80501	The Honorable Karelle Scharff Mayor, Town of Ward Karelle Scharff <karelle@ward-co.org>	Varda Blum, CFM Floodplain Program Manager Boulder County Department of Transportation (720)564-2659 vblum@bouldercounty.org

O 303.651.8438 ▪ F 303.651.8651		
Mark Williams, MEPM, CFM Floodplain Administrator Town of Jamestown town hall:303.449.1806 cell:720.938.0425 home: 303.449.2621	Patricia Gavelda COEM Local Hazard Mitigation Planning Program Manager 970.749.8280 Mobile 970.385.1675 x51830 Desk 970.382.2630 Fax 20591 US HWY 160, Durango, CO 81301	Mark Mullane Boulder County GIS Coordinator Box 471 Boulder, CO 80306 mmullane@bouldercounty.org 303-441-3958
Chard, Mike 3280 Airport Road Boulder, CO 80301 Bus: 303-441-3653 Mobile: (303) 565-7878 Bus Fax: (303) 441-3884 E-mail: mchard@bouldercounty.org	Chris Finn Gold Hill Fire Chief Bus: 303-444-5549	Zach Littlefield@Yahoo. Fourmile FPD Bus: (303) 449-3333 E-mail: zachlittlefield@yahoo.com
Glancy, Robert NWS 325 Broadway Boulder, CO 80305 Bus: 303-494-3210 x726 Mobile: 303-494-3210 x726 Bus Fax: 303-494-4409 E-mail: robert.glancy@noaa.gov E-mail 2: Robert.Glancy@noaa.gov	Mike Cuskelly BVSD Director of Maintenance 720 561-5045 W 303 591-6901 C	Michael J. Richen, CIH Boulder County Public Health Industrial Hygienist 3450 Broadway Boulder, CO 80304 Phone: 303-441-1566; Fax: 303-441-1468 Work Mobile: 303-961-9995 Email: mrichen@bouldercounty.org Websites: www.BoulderCountyAir.org www.Boulder.CountyHealth.org
Dawn Baumhuer Nederland dawenb@nederlandco.org	Hyde, Iain Office of Emergency Management 9195 E. Mineral Avenue, Suite 200 Centennial, CO, 80112 Bus: (720) 852-6698 Mobile: (303) 482-7295	Lawrence, Rebecca IMA Bus: (303) 459-3543 Home: (303) 815-2980 Mobile: (303) 815-2980 E-mail: pblh2o@netzero.net
Whitesell - CDPS, Justin Deputy Chief DFPC E-mail: justin.whitesell@state.co.us		

State Partners:

Division of Homeland Security and Emergency Management

Patricia Gavelda patricia.gavelda@state.co.us - Mitigation Specialist - Planning
Cory Stark cory.stark@state.co.us - North Central Regional Field Manager
Ken Brink kenneth.brink@state.co.us - North Central Mitigation Liaison

North Central All-Hazards Region

Scott Keller skellar@arapahogov.com

Colorado Geological Survey

Karen Berry karen.berry@state.co.us

Colorado Water Conservation Board

Kevin Houck kevin.houck@state.co.us
Jamie Prochno Jamie.prochno@state.co.us

Colorado State Forest Service

District Forester <http://csfs.colostate.edu/pages/your-local-forester.html>

Colorado Department of Transportation

Colorado Department of Local Affairs

Division of Local Government Field Representative ken.charles@state.co.us

Federal Partners:

FEMA Julie Baxter julie.baxter@fema.dhs.gov

Appendix B: Other Resources

NOAA National Climatic DATA Center Storm Events Database:

<http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=8%2CCOLORADO>

Boulder County Emergency Operation Plan Sections.

<http://www.bouldercounty.org/sheriff/oem/plan.htm>

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CU-Boulder Collaboration Will Test Use of Imaging to Find Expansive Soils. May 30, 2002. Alexander Goetz. <http://cires.colorado.edu/news/press/2002/02-05-30.html>

Cooperative Institute for Research in Environmental Sciences. Several articles on expansive soils.

[http://www.google.com/search?q=expansive+soils](http://www.google.com/search?q=expansive+soils&btnG=Search)

City and County of Boulder Office of Emergency Management. www.co.boulder.co.us/sheriff/oem/oem.htm.

City of Boulder Greenways Advisory Committee.

http://www.bouldercolorado.gov/index.php/index.php?option=com_content&task=view&id=5056&Itemid=1189

City of Boulder Greenways Advisory Committee. Harrison Avenue Levee.

<http://www.ci.boulder.co.us/files/Utilities/Greenways/101602.pdf>

The City of Boulder and Boulder County Emergency Response Exercise 2006: Big Thompson Flood on Boulder Creek. "Roche Colorado Levee"

http://www.co.boulder.co.us/emergency/2006_Flood_Exercise.pdf

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http://www.bouldercolorado.gov/files/Finance/Purchasing/2007_52_boulder_creek_flood_study.pdf

Colorado Water Conservation Board Memo. January 22-23, 2008.
http://64.233.167.104/search?q=cache:C0QXV4-9HQWJ:cwcb.state.co.us/board/Agendas/2008/Jan_08/27d.pdf+Provisionally+Accredited+Levee+%22boulder+county%22&hl=en&ct=clnk&cd=2&gl=us

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City of Boulder 2014 Flood Support Handbook

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Boulder THIRA Report 2013, Mike Chard, Director Boulder OEM, February 2013

Urban Drainage and Flood Control District, Lower Boulder Creek Flood Hazard Area Delineation, Muller Engineering Company, Inc., March 1983.

USGS Landslides in Northern Colorado Front Range Caused by Sept 11 2013 flooding, Johnathan Godt, USGS, October 2014

Boulder County Climate Change Preparedness Plan:
<http://www.bouldercounty.org/env/sustainability/Pages/climatechangepreparednessplan.aspx> - 74KB - 4/7/2014

Boulder County Flood.org

USGS Resources, Fact Sheets, and landslide reporting
<http://landslides.usgs.gov>

NRCS National Water and Climate Center Website
<http://www.wcc.nrcs.usda.gov/snotel/Colorado/colorado.html>

National Climatic Data Center. 2006. www.ncdc.noaa.gov/oa/climate/sd/annsum2005.pdf.

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www.dola.state.co.us/dem/mitigation/plan_2007/2002%20Landslide%20Update.pdf

Colorado Lightning Resource Page. National Weather Service, Pueblo. www.crh.noaa.gov/pub/ltg.php.

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Drought Impact Reporter. <http://droughtreporter.unl.edu/>

Emergency Operations Plan Boulder County–City of Boulder. City and County of Boulder Office of Emergency Management <http://boulderoem.com/pdf/emerops.pdf>.

National Center for Atmospheric Research. www.ncar.ucar.edu/.

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www.dola.state.co.us/dem/mitigation/plan_2007/2008_plan.htm.

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<http://drought.unl.edu/dm/>.

U.S. Earthquake Information by State: Colorado. U.S. Geological Survey. Earthquake Hazards Program.
Colorado. 2007. <http://earthquake.usgs.gov/regional/states/colorado/hazards.php>.

West Nile Virus—One Bite, One Life Changed Forever. Boulder County Public Health. 2007.
www.co.boulder.co.us/health/hpe/wnv/index.htm.

Western Regional Climate Center. www.wrcc.dri.edu/.

Zoonotic Diseases. Colorado Department of Public Health and Environment. Disease Control and
Environmental Epidemiology Division. 2007. www.cdphe.state.co.us/dc/zoonosis/.

National Weather Service Denver/Boulder – event information

http://www.crh.noaa.gov/bou/?n=storm_archive

http://www.crh.noaa.gov/crnews/display_archive.php?wfo=bou

Boulder County D.2 Multi-Hazard Mitigation Plan August 2008

Links to the River and Creek master plans:

Fourmile Creek-

<http://www.bouldercounty.org/doc/flood/fourmilecreekwatershedmasterplan.pdf>

Left Hand Creek-

<http://www.bouldercounty.org/doc/flood/lefthandcreekwatershedmasterplan.pdf>

St. Vrain Creek-

<http://www.bouldercounty.org/doc/flood/stvraincreekwatershedmasterplan.pdf>

Appendix C: Community Engagement Documentation

Throughout 2013 and 2014 community meetings have been consistently held to address recovery issues, creek and river restoration and community preparedness. The following is a complete list of events.

Date	Audience	Type	Description
11/12/2013	External	Community Meeting	South St Vrain Road Area - Neighborhood Meeting
11/12/2013	External	Community Meeting	Wagonwheel Gap - Road Construction
11/13/2013	External	Community Meeting	Longmont Dam Road - Neighborhood Meeting
11/14/2013	External	Community Meeting	Lefthand Canyon - Road Construction
11/18/2013	External	Community Meeting	James Canyon - Neighborhood Meeting
11/19/2013	External	Community Meeting	Salina/Gold Run/Wallstreet - Road Construction
11/20/2013	External	Community Meeting	Apple Valley/N. & S. St. Vrain/Longmont Dam - Neighborhood Meeting
12/3/2013	External	Community Meeting	N. St. Vrain, community kickoff - Creek Planning
12/4/2013	External	Community Meeting	S. St. Vrain, community kickoff - Creek Planning
12/4/2013	External	Community Meeting	Longmont Dam Road - Neighborhood Meeting
12/10/2013	External	Community Meeting	Lower/Upper Fourmile - Creek Planning
12/12/2013	External	Community Meeting	Fourmile Canyon and Twomile Canyon Creek - Creek Planning
12/12/2013	External	Community Meeting	St. Vrain Emergency Work - Creek Planning (BCPOS)
12/16/2013	External	Community Meeting	S. St. Vrain, community kickoff - Creek Planning
12/17/2013	External	Community Meeting	Upper Lefthand - Creek Planning
12/18/2013	External	Community Meeting	Lower Lefthand - Creek Planning
1/7/2014	External	Community Meeting	Longmont Dam Road - Neighborhood Meeting
1/8/2014	External	Community Meeting	Boulder and S Boulder Creek - Creek Planning
1/27/2014	External	Community Meeting	Longmont Dam Road Construction Access - Road Construction
1/30/2014	External	Community Meeting	Streamcrest - Neighborhood Meeting
2/4/2014	External	Community Meeting	Roadmap to Recovery - Insurance Workshop
2/12/2014	External	Community Meeting	Tax and Financial Workshop for Disaster Survivors - Tax Workshop
2/12/2014	External	Community Meeting	CDBG-DR Public Hearing
2/19/2014	External	Community Meeting	Prado Drive Neighborhood Drainage Meeting - Neighborhood Meeting
2/24/2014	External	Community Meeting	Salina Junction Drainage Improvement Options Meeting - Neighborhood Meeting
3/5/2014	External	Community Meeting	Apple Valley/N. & S. St. Vrain - Neighborhood Meeting
3/10/2014	External	Community Meeting	Lyons/North & South St. Vrain/Apple Valley/Longmont Dam Road/Little Thompson/ Raymond & Riverside/Big Elk Meadows - Spring Run-off Community Preparedness Meeting
3/11/2014	External	Community Meeting	Fourmile Canyon Dr./Gold Run/Fourmile & Twomile Canyon Creek/Wagonwheel/Lee Hill/ Bow Mountain/Pinebrook/Linden - Spring Run-off

			<i>Community Preparedness Meeting</i>
3/12/2014	External	Community Meeting	Jamestown/Lefthand Canyon/James Canyon/Streamcrest/Brigadoon/Oriole Estates/Nimbus Road - Spring Run-off Community Preparedness Meeting
3/13/2014	External	Community Meeting	South Boulder Creek/Boulder Creek/Coal Creek - Spring Run-off Community Preparedness Meeting
4/1/2014	External	Community Meeting	Lower Fourmile Canyon Drive, Flood Repairs - Road Construction
4/7/2014	External	Community Meeting	Palo Park - Neighborhood Meeting
4/8/2014	External	Community Meeting	Apple Valley NRCS Project Briefing - Creek Planning
4/10/2014	External	Community Meeting	Salina Junction Drainage Improvement Meeting - Neighborhood Meeting
4/16/2014	External	Community Meeting	Fourmile Canyon Dr. - Road Construction
4/16/2014	External	Community Meeting	Little Thompson Land Owners Meeting - Creek Planning
4/16/2014	External	Community Meeting	Flagstaff Road Reconstruction Public Open House - Road Construction
4/17/2014	External	Community Meeting	Public Hearing - High Hazard Abatement
4/22/2014	External	Community Meeting	Public Hearing - High Hazard Abatement
4/22/2014	External	Community Meeting	Gold Run/Forumile NRCS Project Meeting - Creek Planning
4/23/2014	External	Community Meeting	Raymond/Riverside NRCS Projects Meeting - Creek Planning
5/28/2014	External	Community Meeting	Little Thompson Land Owners Meeting - Creek Planning
5/29/2014	External	Community Meeting	Upper Coal Creek Planning - Creek Planning
6/4/2014	External	Community Meeting	Lefthand and James Canyon - Neighborhood Meeting
6/5/2014	External	Community Meeting	Wagonwheel Gap Road - Neighborhood Meeting
6/9/2014	External	Community Meeting	Fourmile/Salina - Neighborhood Meeting
6/11/2014	External	Community Meeting	Apple Valley/N. & S. St. Vrain/Longmont Dam Rd - Neighborhood Meeting
6/12/2014	External	Community Meeting	Raymond/Riverside - Neighborhood Meeting
6/16/2014	External	Community Meeting	St. Vrain Creek Master Plan Kick-Off Meeting-Lyons - Creek Planning
6/19/2014	External	Community Meeting	St. Vrain Creek Master Plan Kick-Off Meeting-Longmont - Creek Planning
7/31/2014	External	Community Meeting	Left Hand Creek Master Plan Kick-Off Meeting-Longmont - Creek Planning
8/1/2014	External	Community Meeting	Left Hand Creek Master Plan Kick-Off Meeting-Greenbriar - Creek Planning
8/12/2014	External	Community Meeting	Flood Recovery Expo at Lifebridge In Longmont
9/3/2014	External	Community Meeting	Fourmile Creek Kickoff meeting - Creek Planning
9/15/2014	External	Community Meeting	St. Vrain Alternatives Analysis Report Community Meeting - Creek Planning
9/17/2014	External	Community Meeting	Lefthand and James Canyon Reconstruction Open House - Road Construction
9/18/2014	External	Community Meeting	St. Vrain Alternatives Analysis Report Community Meeting - Creek Planning

9/22/2014	External	Community Meeting	St. Vrain Alternatives Analysis Report Community Meeting - Creek Planning
9/24/2014	External	Community Meeting	St. Vrain Alternatives Analysis Report Community Meeting - Creek Planning
9/25/2014	External	Community Meeting	St. Vrain Post Master Plan Community Meeting - Creek Planning
10/22/2014	External	Community Meeting	Left Hand Master Plan Community Meeting - Creek Planning
10/23/2014	External	Community Meeting	Left Hand Master Plan Community Meeting - Creek Planning
11/5/2014	External	Community Meeting	Fourmile Community Meeting - Creek Planning
11/6/2014	External	Community Meeting	Fourmile Community Meeting - Creek Planning
12/9/2014	External	Community Meeting	Fourmile Community Meeting next steps - Creek Planning
1/12/2015	Internal and External	Presentation to Public/Commissioners	Review of 2014 work and update on 2015 plans
1/15/2015	External	Community Meeting	Topaz Drive Reconstruction Neighborhood Meeting - Road Construction
2/11/2015	External	Community Meeting	Longmont Dam Road Reconstruction Neighborhood Meeting - Road Construction
2/24/2015	External	Community Meeting	Wagonwheel Gap Road Neighborhood Meeting - Road Construction
3/10/2015	External	Community Meeting	N. 83rd St. over Little Thompson Reconstruction Meeting - Road Construction
3/11/2015	External	Community Meeting	Upper Fourmile Canyon Reconstruction Meeting - Road Construction

Press release announcing the first of two community meetings.
Sent out February 11, 2015
Boulder County official Website



Boulder County
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Community Meeting Scheduled for Feb. 19 to Discuss Updates to the Hazard Mitigation Plan

Wednesday, February 11, 2015

Boulder County, Colo. – The Office of Emergency Management will be holding a community meeting on Thursday, Feb. 19 to discuss updates to the Boulder County Multi-Hazard Mitigation Plan.

The Plan was first created in 2008 and allowed the county to become eligible for certain federal disaster assistance including FEMA's Hazard Mitigation Grant Program and the Pre-Disaster Mitigation program. Boulder County also earned credits for the National Flood Insurance Program's Community Rating System by having a mitigation plan created.

Beginning in 2013, the OEM prepared to revise and update the plan as required by FEMA. A review was completed of the goals our communities set for themselves in the original plan and accomplishments of the past five years were noted. The OEM reassessed the hazards we face and began the facilitation of setting new hazard mitigation goals.

Residents are now invited to a community meeting to discuss the proposed updated to the Multi-Hazard Mitigation Plan.

When: Thursday, Feb. 19, 6:30-8:30 p.m.
Where: Boulder County Clerk & Recorder's Office, 1750 33rd St, Boulder County
Agenda: Introduce the plan's purpose
Review the process and updates to the plan
Discuss hazards and mitigation projects
Introduce the social media program

Visit www.BoulderOEM.com for more information about Emergency Management and the Multi-Hazard Mitigation Plan, or call 303-441-3390.



Gabi Boerkircher
Public Information Specialist
gboerkircher@bouldercounty.org
303-441-3399

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[Community Meeting Scheduled for Feb. 19 to Discuss Updates to the Hazard Mitigation Plan](#)

Wednesday, February 11, 2015

[Boulder County Youth Corps Member Receives Award at State Capitol](#)

Monday, February 02, 2015

[Irrigation ditch, Agricultural and Forestry wood pile burning begin in February](#)

Thursday, January 29, 2015

[Lyons Housing Collaborative Kicks Off Community Visioning Process Jan. 31](#)

Thursday, January 29, 2015

[Applications for teens and adults to apply for summer jobs with Youth Corps now available](#)

Tuesday, January 27, 2015

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Boulder County Firefighter's Association meeting notes

February 5, 2015

BCFFA Mountain Chiefs Meeting

February 5, 2015

Nederland Fire Station 1

Meeting called to order at 1910 hours.

Agencies represented:

Allenspark, AMR, BCSO Emergency Services, BCSO Communications, Boulder County Cooperators, Boulder Emergency Services, Boulder OEM, Boulder Fire, Coal Creek FPD, Four Mile FPD, Gold Hill FPD, Indian Peaks FPD, Jamestown VFD, Left Hand FPD, Nederland FPD, Rocky Mountain Rescue, Sugarloaf FPD

Treasurer's Report

- BCFFA Checking balance (1/31/15) of \$23,919.10
- Liability to BCIMT of \$10,981.01
- Liability to Alsamax (Physician Advisor) of \$2,000.00
- General funds available of \$10,938.09
- EMS Checking balance (1/31/15) of \$2,884.84
- Cooperators Checking balance (12/31/13) of \$15,162
- Training Academy balance (12/31/13) of \$6,629.39

EMS Committee

- Marci Linton has stepped into the roles of Treasurer and RETAC
- EMS Conference was very successful
- CE skills days to be offered quarterly
- Rehab unit being funded by RETAC, staffing regionally?
- MCI planned for Sept hosted by Allenspark

Cooperators

- Sign up for spring courses are currently live (BoCoFire.org)
- RT130 refreshers are available for agency sign up; Boulder Rural opening for general sign up on Monday; other agencies will revert to general sign up later
- Push to improve inter-agency efficiency. Chief's requested to comment on mutual aid expectations – both when you host and when you respond.
- Coal Creek to organize a discussion amongst agencies with company channels on how to best utilize these channels on a mutual aid incident. Agencies with company channels are Coal Creek, Fourmile, Lefthand, Nederland, Sugarloaf, Sunshine and Timberline.

Training Center

- Sign & Return 2015 Use Agreement / Release to Marci Linton
- Create and follow a burn plan per NFPA 1403
- Reminder to agencies to keep facility clean after use
- Working on Diagonal Hwy access gate
- Confined space prop in development

EOC Mobilization Plan

- Needed to qualify for reimbursement on a major incident
- Agencies are encouraged to sign onto County plan
- Contact Mike Chard if you need a copy

Conference in fall? for chief officers to disseminate info on Mob Plan and Annexes

Boulder Emergency Services

- Working to improve specialized equipment resource ordering

EOC

- Natural Hazard Mitigation Plan posted on website; seeking comments; plan to adopt in March and submit to FEMA
- (<http://boulderoem.com/natural-hazards-mitigation-plan>)
- Tri-county (Boulder, Jefferson, Douglas) wildfire exercise planned for May 21, 2016 with emphasis on transition from Type 4 to Type 3
- Everbridge is being upgraded –different look but works the same
- Infectious disease planning
- 2015 IMT status update letters are due / inactive status is an option
- Legislation
- HB 1017 would make private vendors recognized by state / grant eligible
- HB 1129 to fund wildfire and flood predictive services center

Officer Nominations / Elections

- No new nominations received
- Mike Osman (Allenspark) motioned to call for a vote on nominations made at Dec meeting; seconded by Chris Finn (Goldhill); and passed by voice vote
- Bret Gibson (Pres)
- Rick Dirr (Vice Pres)
- Joe Ceurvorst (Sec/Treas)

Boulder Fire

- Discussing regional hazmat response

GIS Update

- ESRI has indicated BCFFA would not be able to use its 501c3 status to purchase GIS license at non-profit rate and then distribute seats (\$150 per seat annually) to member agencies
- Individual agency license annual fee is \$1500 for one seat
- Option to use county data / programmers?
- Tabled any definitive decisions

BES

- Updating response per 2014 floating victim / recovery incident AAR

Jamestown

- Looking for SCBA's

Meeting adjourned at 2130 hours.

Next meeting 4/2/15 at 1900 hrs – Nederland Stn 1
BCFFA February Attendance Meeting

BCFFA ATTENDANCE			DATE: 2.05.15	
Agency	Name	Position	Phone	E-Mail
Allenspark FPD	Mike Damm	Chief	970-744-8757	chief@allensparkfire.com
AMR	Chris Williams	Manager	720/354/6501	clawstgater-williams@amr.net
BCES	Marci Linton	ES	303-441-3646	mlinton@bouldercounty.org
BCSO Communications	Steve Surawski	Manager	903-817-3732	ssurawski@bouldercounty.org
BC Cooperators				
BES	Andy Anagnostou	Chief	720.220.0466	Chief@BoulderRescue.org
Boulder OEM	Mike Chard	Director	3.565-7878	Michael@bouldercountry.org
Boulder Fire	Michael Calderazzo	Chief	720-455-4455	calderazzo@boulderfire.gov
Boulder Rural FPD				
Big Elk Meadows				
Boulder County Land Use				
Boulder Mountain FPD				
Coal Creek Canyon FPD	Joe Czerwinski	Chief		chief@coalcreekcanyon.org
Colorado State Forest Service				
Four Mile FPD	Bret Gibson	Chief		
Gold Hill FPD	Chris F. W.	Chief	3/448549	cfinn@nho.net
Hygiene FPD	Arne McEwen	Chief	303.544.1361	arnemc@hygiene.org
Indian Peaks FPD	David Mann / Arne McEwen	Chief		
Jamestown VFD				
Lafayette VFD				
Left Hand FPD	Clayton Kusner / Chris Stein	Manager / Paul Benner	303-449-3575 / 357660	claytonk@left-hand.org / cstein@left-hand.org
Longmont OEM				
Lyons FPD				
Nederland FPD	Rock Durr	C-1	3-258-9161	Chief@NFPD.ORG
Pinewood Springs FPD				
Rocky Mountain Fire				
Rocky Mountain Rescue	Kelly Lucy	Qualified Member	7630-3455	Kelucy2@gmail.com
Sugarloaf FPD	M. Bader / T. Schwab	Chief		
Sunshine FPD		Chief	31786-7414	SHIERESUNSHINE-FPD.ORG
Timberline FA				
US Forest Service				
BCS	Ryan Singel	Lieutenant	720-391-5113	RyanSingel@bouldercs.org
BCS - Emer				
Boulder County Coop	Fritz Kosh			
Coal Creek Canyon FPD	Adam Jack	Lieutenant	5056427863	adam.jack@coalcreekcanyon.org

The 2013 Flood caused a delay in the completion of the Boulder Hazard Mitigation Plan. The following year the capacity to continue the plan was suspended to allow for an intense recovery effort. On December 8, 2014 a Re-Engagement Meeting was held to get stakeholders energized to participate in resurrected planning effort.

Sign in Sheet for the meeting.

**Hazard Mitigation Kick-off Meeting
8-Dec-2014**

Name	Organization/Agency	Phone	Email
FRED DIEM	TOWN OF EVANS	304-49327	FRED@EVANS.CO.GOV
Patricia Perez	" "	303-651-8168	patricia.perez@bouldercolorado.gov
Peter Perez	Longmont OEM	303-651-8168	peter.perez@longmontcolorado.gov
Donna Henderson	Boulder County Transportation	303-441-3962	henderson@bouldercounty.org
Dale Cox	Boulder County Land Use	720-564-2609	dcox@bouldercounty.org
Becky Franco	Denver Water	720-607-3160	rebecca.franco@denverwater.com
Kevin Edwards	UP/CD	303-455-1277	kedwards@upcd.org
Leslie N. Thompson	BCPIT		
Mike Thomas	BoCo Trans	71464-7655	mthomas@bouldercounty.org
Earl Barry	self	32333110	earlbarry@comcast.net
Kristin DeHaven	City of Boulder	303-441-4259	kristin@bouldercolorado.gov
Lisa Fritsch	BOCO	304-413322	lfritsch@bouldercounty.org

**Hazard Mitigation Kick-off Meeting
8-Dec-2014**

Name	Organization/Agency	Phone	Email
Gerry Kelly	Red Cross	720-839-5210	gerardkelly99@comcast.net
John Kelly	BoCo Land Use	720-564-2611	john.kelly@bouldercounty.org
Michelle Light	BoCo	23521	mlight@bouldercounty.org
Mark Williams	Jameson	303-447-2621	mark.williams@jamesonco.org
Nike Grogan	BVSD	303-441-6501	nike.grogan@bvsd.org
Vard a Blum	BCCO	303-564-2621	vblum@bouldercounty.org
Victoria Simonson	TOWN OF LYONS	5023-6622	vsimonson@townoflyons.com
Mike Richer	BCPIT	1566	

Social Media Presentation:

On July 17, 2013 Boulder OEM engaged in a social media community engagement program. The previous attempts in the 2008 plan had only 10 attendees at the traditional community meetings. The goal of the social media program is to engage the community in a relationship to not only review the plan but also create a following for subsequent update activities. The following are the two presentations made at a HMP planning team meeting .

The Boulder County Natural Hazard Mitigation Plan Revision

Community Engagement through Social Media



As with any civic effort, the process to revise and update the Boulder Multi-Hazard Mitigation Plan will benefit from broad public participation. The Boulder Office of Emergency Management is launching a *virtual* planning process using social media to engage the community and broaden the dialogue.

Public participation in hazard mitigation planning is low

- 2008 public meeting had 10 attendees



- Can social media facilitate increased public participation?

Three legged stool

1. Increase "likes" on Facebook and "Followers" on Twitter (you can help!)
2. Push "interest specific" content (I'll do this)
3. Engage public on-line (you can help!)



Increase "Likes" and "Followers"

- Target individuals and organizations with audiences we want to reach:
 - Local journalists/ media outlets
 - Business owners/ trade groups
 - Community organizations/ churches / service clubs
 - Civic organizations /schools & universities/ service agencies
 - Access and Functional Needs
- Get your social media contacts to Like and Follow OEM, share and re-tweet our content:
 - Your co-workers
 - Your customers
 - Your partners
 - Your personal friends/family
- Survey: <http://www.surveymonkey.com/s/BoulderHazardsSurvey>
- <http://svy.mk/1OX3RPR>
 - People like taking surveys
 - Opportunity to introduce the NHMP and encourage people to think about hazards in their community
 - Gather opinions/ideas
 - Drive people to OEM website, Facebook, Twitter
 - Keep people engaged

Content aimed at specific interests of our target audiences:

- Businesses
- Churches/Faith Based Organization
- People with access and functional needs

- 2 Press Releases

Retweets:

- Daily Camera = 19,000 followers
- City of Boulder = 12,000 followers
- Longmont Times-Call = 4,500 followers
- KGNU = 3,500 followers
- Boulder County Public Health = 2,500 followers

- Boulder County Care Connect = 392 followers
- Boulder Housing Partners = 328 followers

- Boulder OEM = 3,700



Facebook Posts:

- Each article posted to Facebook with link to website and/or survey
- Each viewed by 600 – 700
- Quiz questions have proven popular with more than 700 views



Spanish Version:

- 0 Retweets
- 300 views on FB
- 0 surveys completed

- The translation is at a higher education level than the community we are trying to reach
- A general distrust of government within the community
- Limited access to social media within the community

El Plan de Mitigación Riesgos del condado de Boulder

Survey Results:

As of the morning of Saturday, August 10:
• 151 surveys completed

• City of Boulder	40%
• Unincorporated Boulder County	30%
• Lafayette	22%
• Jamestown	10%
• Longmont	10%

Total adds up to more than 100% because respondents can give more than one answer.



57% of respondents indicated they were not aware of the 2008 Multi-Hazard Mitigation Plan.

78% indicate they did not participate in the development of the 2008 plan in anyway.



The top three hazards of concern:



• Wildfire	74%
• Drought	48%
• Flood	41%

The hazards of less concern:

- Avalanche
- Earthquake
- Expansive Soils
- Subsidence

Each received 3 or fewer votes.



82% of respondents indicate that they do not think there are any hazards NOT addressed in our plan that should be.

Here is a sample of some of the hazards respondents think should be included that are not:

•At a minimum, there should be a link addressing Climate Change through Sustainability Planning. Climate drives the weather which drives the events affecting us

•Train derailment / Toxic spills given train routes through a number of communities and also some of the labs located in Boulder County

•Rabies and other animal to human diseases / diseased wildlife, prairie dogs, rabbits, coyotes

•Fracking and oil / gas drilling

•Power Grid going out



Out of all hazards which is the most concerning:

Wildfire	48%
Flood	14%
Drought	13%

What would be the biggest impact to you and your family if this hazard occurred in your neighborhood today?

Loss of home/damage to property	48%
Travel restrictions/ "annoyances"	10%
Water restrictions/ loss of vegetation	10%

These are trends, not statistical realities.

76% of respondents indicate that they, or their community, have participated in mitigation activities in the past 5 years.

Fuel Reduction/Defensible Space	47%
Reduced water usage/Drought resistant landscape	12%
Personal Preparedness Plans/Awareness& Education	12%

76% of respondents indicate that they, or their community, have participated in mitigation activities in the past 5 years.

Fuel Reduction/Defensible Space	47%
Reduced water usage/Drought resistant landscape	12%
Personal Preparedness Plans/Awareness& Education	12%

What actions can your local government or Boulder County take to help eliminate or reduce risk?

Defensible space/ land management/ fire bans	25%
Education/outreach/awareness	20%
Water restrictions/grey water usage/cistern usage	7%

NEXT STEPS:

- When draft plan is available it will be posted to OEM website and linked on FB and Twitter for public review and comment
- Content to encourage discussion and questions via the Facebook page

HMP Invitation Letter June 28, 2013

You forwarded this message on 7/1/2013 4:43 PM.

From: Chard, Mike
To: 'Allen Owen'; 'Ben Pedretti'; 'Bootton, David'; 'Bruce Goodman'; 'Carolyn Cutler'; 'Case, Dale'; 'Chamberlin, James'; 'Charles Sisk'; 'Chris Allison'; 'Dan Eamon'; 'Deon Pfenning'; 'Domenico, Cindy'; 'Fred Diehl'; 'Frederick, Mark'; 'Gerry Morrell'; 'Goldberger, Nicholas'; 'Hall, Emma'; 'Joe Gerlach'; 'John Benson'; 'Kevin Houck'; 'Kevin Stewart'; 'Krezek, Michelle'; 'Kurt Bauer'; 'Larry Donner'; 'Les Mattis'; 'Marilyn Gally'; 'Mark Lawley'; 'Matt Magley'; 'Michelle Iaw'; 'Mullane, Mark'; 'Norman Bowers'; 'Pelle, Joe'; 'Peterson, Jane'; 'Rebecca Lawrence (bbl2u@netzero.net)'; 'Rebecca Martinez'; 'Rishen, Michael'; 'Stacy Davis'; 'Stonopher, Pam'; 'Tara Schoedinger'; 'Thomas, Mike'; 'Tim Parker'; 'Victoria Simonsen'; 'Webb, Jeff'; 'Webster, Dave'; 'Webster, James B'; 'Widdekind, Lisa'
Cc: Pelle, Joe; DOWNERL@boulder.colorado.gov; Beckner, Mark
Subject: Hazard Mitigation Planning Invitation

Message HMP Gant Chart.pdf HMP Invitation Letter 2013.doc

Greetings,

The Boulder County HMP is due for an update and we are asking for your help in completing the new plan. Please review the attached invite letter and consider participating in the upcoming kick-off meeting on July 16th from 9-11 at the Clerk and Recorder Building in the Houston Room.

Thank you for your consideration,

Michael N. Chard

Director
Boulder Office of Emergency Management
303-441-3653- Office
303-565-7878- Cell
3280 Airport Road
Boulder, CO 80301

HMP letter sent to the State of Colorado OEM

Delete Respond Move Tags Editing Zoom

You forwarded this message on 7/2/2013 10:27 AM.

From: Chard, Mike
To: 'corey.stark@state.co.us'; Brink - CDPS; Ken (kenneth.brink@state.co.us); 'patricia.gavelda@state.co.us'; Marilyn.Gally@state.co.us; Skeller@arapahoe.gov; 'karen.berry@state.co.us'; 'kevin.houck@state.co.us'; 'ken.charles@state.co.us'
Cc:
Subject: Boulder County Hazard Mitigation Plan

Message HMP Invitation Letter 2013.doc HMP Gant Chart.pdf Multihazardplan County.pdf

Greetings,

Boulder County is currently updating our Hazard Mitigation Plan and will be hosting a kick-off meeting on July 16th. The meeting will be held at the Boulder County Clerk and Recorder building located at 1750 33rd Street Boulder, CO 80301. The meeting will be held in the Houston room located on the north side of the building on the first floor from 9-11 a.m.

Attached is the invitation letter, pdf of the current plan and Gant planning chart showing the timeline of events to accomplish this update process.

We hope you can attend but if you cannot and would like to receive meeting notes and scope of work products please indicate so by returning an email.

Regards,

Michael N. Chard

Director
Boulder Office of Emergency Management
303-441-3653- Office
303-565-7878- Cell
3280 Airport Road
Boulder, CO 80301

HMP letter sent to FEMA

From: Chard, Mike
To: Julie Baxter (Julie.Baxter@fema.dhs.gov)
Subject: Boulder County Hazard Mitigation Plan - Update Process

Message Multihazardplan County.pdf HMP Gant Chart.pdf HMP Invitation Letter 2013.doc

Greetings,

Boulder County is currently updating our Hazard Mitigation Plan and will be hosting a kick-off meeting on July 16th. The meeting will be held at the Boulder County Clerk and Recorder building located at 1750 33rd Street Boulder, CO 80301. The meeting will be held in the Houston room located on the north side of the building on the first floor from 9-11 a.m.

Attached is the invitation letter, pdf of the current plan and Gant planning chart showing the timeline of events to accomplish this update process.

We hope you can attend but if you cannot and would like to receive meeting notes and scope of work products please indicate so by returning an email.

Regards,

Michael N. Chard
Director
Boulder Office of Emergency Management
303-441-3653- Office
303-565-7878- Cell
3280 Airport Road
Boulder, CO 80301

HMP Invitation Letter

June 31, 2013

Greetings,

The Boulder Office of Emergency Management is currently updating the Federal Emergency Management Agency (FEMA) - approved hazard mitigation plan (HMP) for Boulder County. The current plan was adopted in 2008 and has a five year life cycle before updating the plan is required. Having this plan updated and approved by FEMA allows participating agencies and organizations to qualify for pre-disaster or post-disaster mitigation funds. In addition, an approved hazard mitigation plan increases the opportunity for maximum federal funding allocation for disaster recovery under a Stafford Act Disaster Declaration. The most important outcome of the HMP is that it can have a positive effect on reducing or eliminating the effects of natural hazards on individuals and the community.

If you agree to be involved the following steps are to be utilized in updating the existing hazard mitigation plan:

Kick-off meeting- HMP planning team members review the existing plan, evaluate past goals, refresh risk and hazard analysis information, determine next steps related to planning and community engagement.

- Community Capability and Mitigation Strategy Development - This is a facilitated meeting that will review what are the current community capabilities such as flood insurance programs, building codes, education and planning. Prior mitigation strategies are also evaluated to determine if they were implemented over the past 5 years and if not still current. New mitigation strategies are to be developed and prioritized based on hazard and risk assessments presented in the prior meeting.
- Community Engagement- Social media is a possible effective tool to use for engaging the community in the HMP process. BOEM will initiate a social media engagement campaign following the kick-off meeting and continue as each benchmark is achieved in the process. Community engagement will end on September 27th in a series of three meetings, one in the mountains, central and east Boulder.
- Partner and Stakeholder Engagement- Prior to the capability and mitigation strategy meeting, key partners and stakeholders will be invited to participate based upon the planning committee's recommendation. This may be a separate meeting due to size or need.
- First Draft of Plan- Based upon feedback and information collected at the kick off meeting, strategy development meeting, community engagement meetings, and partner / stakeholder feedback a first draft of the plan shall be completed. There will be a subsequent 30 day review period.
- Second Draft of Plan- By the third week of October the feedback provided from the first draft review period shall be incorporated into the second draft of the hazard mitigation plan. The plan will be distributed to all participating groups or members and the final draft completed in the first week of November.
- Final Version of HMP- On October 1st an approval guidance document shall be sent to all organizations needing to authorize the plan through resolution or adoption. BOEM will provide

guidance direction for communities to follow in order to acquire all documentation needed to include with the submission of the plan to FEMA.

- HMP Project Chart see attachment.

The success of this planning process is solely dependent upon your participation. I do hope that you find this a worthwhile endeavor to support and participate in over the next 5-6 months. The Boulder Office of Emergency Management invites you to attend our hazard mitigation plan kick-off meeting on July, 16th 2013 from 9 to 11 a.m. at the Boulder Clerk and Recorder's Office, 1750 33rd Street Boulder, CO 80301. The meeting is going to be in the Houston Room located on the north side of the building on the first floor.

We hope to see you there and please RSVP that you are going to be attending by sending an email to Francesca Gonzales at fgonzales@bouldercounty.org or calling 303-441-3390.

Regards,

Michael N. Chard
Boulder Office of Emergency Management
3280 Airport Road
Boulder, CO 80303
303-441-3653
mchard@bouldercounty.org

Kick Off Meeting Sign In Sheets 07/10/2013

July 10, 2013
Boulder County Hazard Mitigation Kickoff Meeting

Name	Organization	Phone	Email
Don Borten	BCCS ES	303-441-3487	dborten@bouldercounty.org
Cheryl Phillips	advent	760-821-8883	cheryl@advent.com
Ryan Wilbur	BCCS LU	303-441-3491	rwilbur@bouldercounty.org
Ute Harris	Town of Steamboat	970-861-4000	uharris@steamboatcity.com
Lee Doremy	Adams Services PCO	3-441-1356	ldoremy@adamservices.com
Dawn Platte	City of Steamboat	3-441-3431	dawn.platte@steamboatcity.com
Vickie Swanson	Town of Lyons	3-823-6672	vswanson@townoflyons.com
Kevin Stewer	ADPSO	775-677	kstewer@adps.com
ARC BUTTERFOS	El Paso 444-1000	3/689-4592	arc@butterfos.com

July 10, 2013
Boulder County Hazard Mitigation Kickoff Meeting

Name	Organization	Phone	Email
Don Borten	Boulder County	303-441-3487	dborten@bouldercounty.org
Cheryl Phillips	advent	760-821-8883	cheryl@advent.com
Ryan Wilbur	BCCS LU	303-441-3491	rwilbur@bouldercounty.org
Ute Harris	Town of Steamboat	970-861-4000	uharris@steamboatcity.com
Lee Doremy	Adams Services PCO	3-441-1356	ldoremy@adamservices.com
Dawn Platte	City of Steamboat	3-441-3431	dawn.platte@steamboatcity.com
Vickie Swanson	Town of Lyons	3-823-6672	vswanson@townoflyons.com
Kevin Stewer	ADPSO	775-677	kstewer@adps.com
ARC BUTTERFOS	El Paso 444-1000	3/689-4592	arc@butterfos.com

July 10, 2013
Boulder County Hazard Mitigation Kickoff Meeting

Name	Organization	Phone	Email
Barbara Hohl	BCCS	303-441-3487	bhohl@bouldercounty.org
Quinn MacLeod	Rocky Mountain DRI	303-441-3487	quinn@rockymountain.com
Lee Harris	ESD AD	303-441-3487	lee@esd.com
RICK DARR	Ned FIRE	3-258-9161	rick@nedfire.org
Mike Thomas	BCCS Transportation	3-564-2651	mthomas@bouldercounty.org
NICK GARDNER	BCCS	3-258-5381	nick@bouldercounty.org
Mike Gardner	CoB	3-441-4232	mgardner@bouldercounty.org
Lee Winkler	BCCS	3-441-3487	lee@bouldercounty.org
Chris Miller	Lyons	3-823-6672	cmiller@townoflyons.com
John Miller	Town of Lyons	3-823-6672	john@townoflyons.com
Don Borten	BCCS	303-441-3487	dborten@bouldercounty.org

HMP Invitation to Mountain Communities through the Inter Mountain Alliance

The Inter Mountain Alliance meets once a month and OEM attends each meeting. Following the invitation below monthly updates were provided to the group related to the Hazard Mitigation Plan's development.

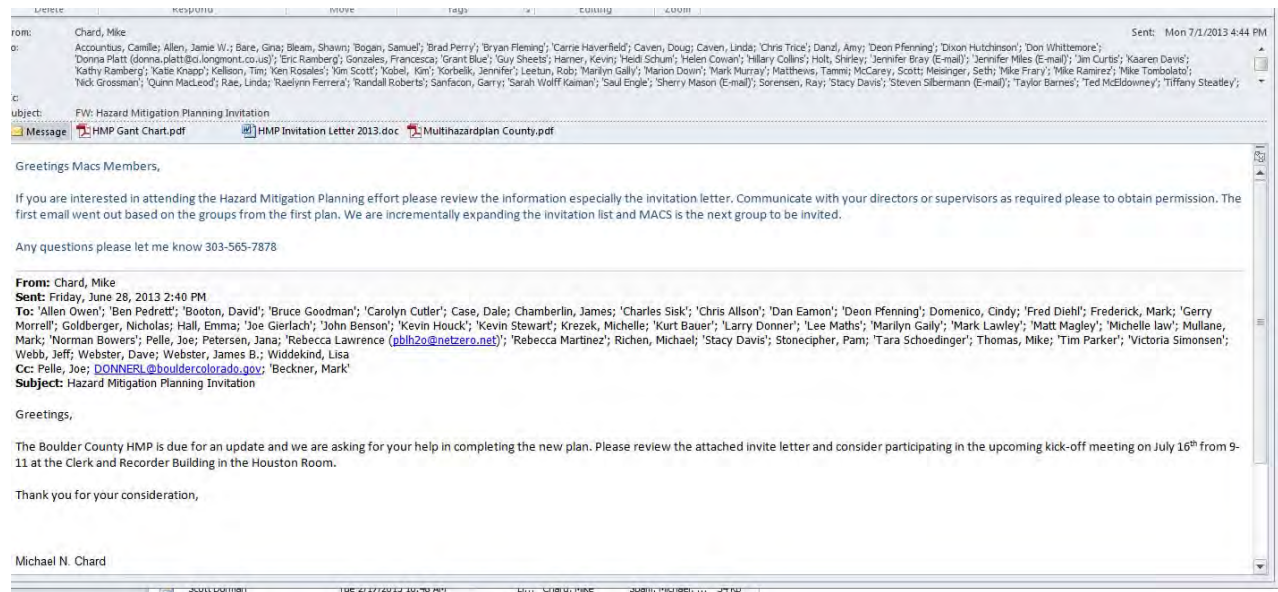


On December 18, 2014 the HMP draft was presented to the Inter Mountain Alliance Group for review and feedback was incorporated into the final draft of the plan. Below is the sign in sheet for that particular meeting.

1. Event Name	2. Operational Period (Date/Time)	3. Check-in Location	CHECK-IN LIST (Personnel)	
HMP MEETING	From: 1000 - To: 1115	Nederland	EOC 211p -OS	
Personnel check-in Information				
4. Name	5. Organization / Agency	6. ESF / Section / Assignment	7. Contact Information	8. Time
			Phone #	Email
Amy E. Hardy	Town of Ward	Indian Peaks - FHW	3-653-288	AHARDY105@yahoo.com
Karelle Scharff	Town of Ward	Mayor	3-906-3303	karelle.scharff@gmail.com
William Ellis	Altamont Neighbors Emergency Network		3-747-2421	wellis@comcast.net
Dennis Whalen	Nederland Food Pantry		3-642-1435	Dennis.Whalen@gmail.com
Dina Elder	Gold Hill Airlift		3-459-3530	dina.elder@gmail.com
Jan Musser	EPAC	Town of Nederland	3-258-7952	mmusser@wisper.net
Dawn Baumbach	Town of Nederland		3-258-9701	dawnb@nederlandco.org
Randy Lee	Town of Nederland		3-258-9703	randy.l@nederlandco.org
Pam Sherman	Gold Hill	Town of	3-606-6803	pamster123@gmail.com
John O'Brien	LYONS		3-818-9275	jobrien@townoflyons.com
Grace Miller	Fossil Creek Canyon		720-244-1072	jgracemiller@msn.com
Joe Callahan	BCARES	2	303-774-0499	longmontjoe@gmail.com
Sylvia Clark	U.S. Forest Service			sgclark@fs.fed.us
Tim Fisher	BCARES		303-443-0138	NUBBETHILLRD@GMAIL.COM
William L. Van Matre	Gold Hill, Left Hand		303-443-0138	" "
9. Prepared By: MIKE CHARD Date/Time: 12/18/14/0955 10. Date/Time sent to Resources Unit: 12/18/14 @ 1345				
CHECK-IN LIST (Personnel)				

HMP Invitation to Boulder Multi Agency Coordination Group 07/01/2013.

This group meets on the first Monday of each month and a Hazard Mitigation Update was included in each month's agenda. Drafts were circulated to the following email list as draft versions were completed. Feedback was collected and incorporated into each draft version of the plan.



List of recipients in MACS Group:

Accountius, Camille <caccountius@bouldercounty.org>; Allen, Jamie W. <jwallen@bouldercounty.org>; Bare, Gina <gbare@bouldercounty.org>; Bleam, Shawn <sbleam@bouldercounty.org>; Bogan, Samuel <Samuel.Bogan@colorado.edu>; 'Brad Perry' <bperry@bch.org>; 'Bryan Fleming' <bryan.fleming@amr.net>; 'Carrie Haverfield' <chaverfield@bouldercounty.org>; Caven, Doug <dcaven@bouldercounty.org>; Caven, Linda <lcaven@bouldercounty.org>; 'Chris Trice' <tricec@bouldercolorado.gov>; Danzl, Amy <adanzl@bouldercounty.org>; 'Deon Pfenning' <deon.pfenning@colorado.edu>; 'Dixon Hutchinson' <hutch@tikasys.com>; 'Don Whitemore' <dwhitemore@rockymountainfire.org>; 'Donna Platt (donna.platt@ci.longmont.co.us)' <eandkram@comcast.net>; 'Eric Ramberg' <egonzales@bouldercounty.org>; 'Grant Blue' <cgblue@comcast.net>; 'Guy Sheets' <guy.sheets@lmco.com>; 'Harner, Kevin' <kharnar@bouldercounty.org>; 'Heidi Schum' <schumh@bouldercolorado.gov>; 'Helen Cowan' <cowanh@bouldercolorado.gov>; 'Hillary Collins' <hcollins@bouldercounty.org>; 'Holt, Shirley' <shholt@bouldercounty.org>; 'Jennifer Bray (E-mail)' <BrayJ@boulderlibrary.org>; 'Jennifer Miles (E-mail)' <milesJ@bouldercolorado.gov>; 'Jim Curtis' <jimcurtis@att.net>; 'Kaaren Davis' <davisk@bouldercolorado.gov>; 'Kathy Ramberg' <katram2@yahoo.com>; 'Katie Knapp' <knappk@bouldercolorado.gov>; 'Kellison, Tim' <tkellison@bouldercounty.org>; 'Ken Rosales' <krosales@bouldercounty.org>; 'Kim Scott' <scottk@bouldercolorado.gov>; 'Kobel, Kim' <KobelK@bouldercolorado.gov>; 'Korbelik, Jennifer' <KorbelikJ@bouldercolorado.gov>; 'Leetun, Rob' <rleetun@bouldercounty.org>; 'Marilyn Gally' <marilyn.gally@state.co.us>; 'Marion Down' <downm@bouldercolorado.gov>; 'Mark Murray' <markm@cityoflafayette.com>; 'Matthews, Tammi' <tmatthews@bouldercounty.org>; 'McCarey, Scott' <smccarey@bouldercounty.org>; 'Meisinger, Seth' <smeisinger@bouldercounty.org>; 'Mike Frary' <fjwildlandfire@yahoo.com>; 'Mike Ramirez' <ramirez@bouldercolorado.gov>; 'Mike Tombolato' <mike@rockymountainfire.org>; 'Nick Grossman' <grossmann@bouldercolorado.gov>; 'Quinn MacLeod' <qmacleod@rockymountainfire.org>; 'Rae, Linda' <lrae@bouldercounty.org>; 'Raelynn Ferrera' <rferrera@erieco.gov>; 'Randall Roberts' <robertsr@bouldercolorado.gov>; 'Sanfacon, Garry' <gsanfacon@bouldercounty.org>; 'Sarah Wolff Kaiman' <sarah_wolff@contractor.nps.gov>; 'Saul Engle' <maxblue1@gmail.com>; 'Sherry Mason (E-mail)' <sherry.manson@usw.salvationarmy.org>; 'Sorensen, Ray' <rsorensen@bouldercounty.org>; 'Stacy Davis' <davis_stacy@stvrain.k12.co.us>; 'Steven Silbermann (E-mail)' <ssilbermann@bouldercounty.org>; 'Taylor Barnes' <barnest@bouldercolorado.gov>; 'Ted McEldowney' <mceldowney@bouldercolorado.gov>; 'Tiffany Steatley' <chief@leu-rescue.org>; 'TParker@louisvillefire.com' <tallen@bch.org>; 'Vickie Lytle' <valytle@gmail.com>; 'Ysaye Zamore' <yzamore@mhpcolorado.org>;

#SheriffJailManagementStaff <SheriffJailManagementStaff@bouldercounty.org>; 'A. Bartha' <bartha@bouldercolorado.gov>; 'Adam Fitzwater' <afitzwat@du.edu>; 'Alex Ragulsky (alex@louisvilleco.gov)'; 'Amy Tremper' <40inseam@gmail.com>; 'Anita Albrecht' <aalbrecht@atcd.net>; 'Annie Noble' <noblea@bouldercolorado.gov>; Barber, Dan <dbarber@bouldercounty.org>; 'Bart Banks (E-mail)' <Bart.Banks@usw.salvationarmy.org>; 'Bill Hayes' <bhayes@bouldercounty.org>; 'Bob Eichem' <eichemb@bouldercolorado.gov>; 'Bob Harberg' <harbergb@bouldercolorado.gov>; 'Bob Zimprich' <Bobzz@comcast.net>; 'Bonnie Baker' <bbaker1949@aol.com>; Booton, David <dbooton@bouldercounty.org>; Bosley, Molly <Molly.Bosley@Colorado.edu>; 'Boulder County Security' <security@bouldercounty.org>; 'Bret Gibson' <bret@bouldermountainlodge.com>; 'Brian Lindsey' <blindsey@bouldercounty.org>; 'Bruce Hertelendy (1700zulu@gmail.com)'; 'Capt. 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Annexes

Community Annexes are designed to provide details about the wonderful communities in Boulder County. Each Community as part of this whole community process is asked to provide current data and content about their community for the Hazard Mitigation Plan. Unfortunately the update of this document occurred during a very difficult recovery process from the 2013 Colorado Floods. Not all communities were able to provide the most current information or update their annex. Communities will be engaged for the life of the plan and at update opportunities their annex will be modernized.

Annex A: Boulder County

Annex A: Boulder County

.A.1 Community Profile

See Section 2 Community Profile.

A.2 Hazard Identification and Summary

See Section 4 Risk Assessment /Hazard Identification

A.3 Asset Inventory

See Section 4 Risk Assessment - Vulnerability Assessment subsection.

A.4 Growth and Development.

See Section 4 Risk Assessment - Vulnerability Assessment subsection..

A.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes the Unincorporated County's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

A.5.1 Mitigation Capabilities Summary

Table A.1 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Boulder County.

Table A.1. Boulder County's Regulatory Mitigation Capabilities Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Boulder County Comprehensive Plan, 1999, plus subsequent amendments. Plan has elements covering Geology, Natural Hazards, Environmental Resources and Fire Protection. 2014 Watershed Master Plans.
Zoning ordinance	Yes	Article 4 of the Land Use Code
Subdivision ordinance	Yes	Article 5 of the Land Use Code
Site plan review requirements	Yes	Article 4-800 of the Land Use Code
Growth management ordinance	Yes	Boulder County Super Intergovernmental Agreement sets growth boundaries for all communities in the County

Regulatory Tool (ordinances, codes, plans)	Yes	Article 4-400 of the Land Use Code
Yes/No Comments Floodplain ordinance		
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Land Use Code regulations cover wildfire, stormwater management, and site review for slope, access, etc. Article 19, Procedures Following Disasters, defining Hazard Mitigation Review.
BCEGS Rating	Yes	Last done in 2010 – rating 3/3
Building code	Yes	International Building Code 2012, wind and snow load design standards
Fire department ISO rating	Yes	In place for most fire protection districts in the County, varies
Erosion or sediment control program	Yes	Article 7-903 of the Land Use Code
Stormwater management program	Yes	Article 7-904 of the Land Use Code
Capital improvements plan	Yes	Seven-year program; Urban Drainage and Flood Control District has a five-year plan for bridge replacements
Economic development plan	Yes	Economic Element to Boulder County Comprehensive Plan
Local emergency operations plan	Yes	Emergency Operations Plan Boulder County-City Of Boulder,

		1998, in the process of being updated
Other special plans	Yes	Several fire protection districts have community wildfire protection plans
Flood insurance study or other engineering study for streams	Yes	FEMA FIS, December 18, 2012; hard copies of all stream/flood studies on file with Transportation Dept.
Elevation certificates	Yes	On file with the Transportation Department

Table A.2 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Boulder County.

Table A.2. Boulder County's Administrative and Technical Mitigation Capabilities Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Land Use, Planning Division	12 planners
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Land Use, Building Division; Administrative Services, Architects' Division; Administrative Services, Facilities' Division; Transportation, Planning Division	4 plan examiners (Land Use); 3 licensed architects, 1 licensed contractor, 1 master electrician, 11 electricians, 2 infrastructure project managers, construction crews (Administrative Services); 1 surveyor and 7 engineers (Transportation)
Planner/engineer/scientist with an understanding of natural hazards	Yes	Parks and Open Space	2 foresters, 1 hydrologist, 1 water engineer, and 5 planners
Personnel skilled in GIS	Yes	Land Use; Assessor; Parks and Open Space; Sheriff's Office; Information Technology; Transportation, Road Maintenance; Public Health	20+ staff total

Full-time building official	Yes	Land Use, Building Division	1 chief building official; 4 plans examiners; 5 inspectors
Floodplain manager	Yes	Transportation	6 certified floodplain managers
Emergency manager	Yes	Sheriff's Office	Office of Emergency Management
Grant writer	Yes	Various	Several staff have this as part of their job descriptions; one grants coordinator in Finance
Other personnel	Yes	Land Use; Transportation;	2 wildfire mitigation coordinators (Land Use); 55 equipment operators (Transportation); FEMA-trained public information staff (commissioners); various trades and administrative/communications staff throughout the County
GIS Data – Hazard areas	Yes	Land Use, GIS division	Wildfire and geology layers, Flood Hazard areas
GIS Data – Critical facilities	Yes	Transportation, Road Maintenance; Public Health	Critical transportation/evacuation routes/structures in roadway infrastructure layers (Transportation); nursing homes and assisted living centers within the floodplain (Public Health)
GIS Data – Building footprints		Yes	
GIS Data – Land use	Yes	Land Use, GIS division	Zoning, etc.
GIS Data – Links to assessor's data	Yes	Assessor's Office	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Generally, Sheriff	Reverse 911; cable override at Public Safety Building; sirens throughout the County; emergency paging system for County staff

Other	Yes	Various	Close coordination with partner agencies throughout Boulder County, such as BCARES, CERT volunteers, RTD, Special Transit, School districts, CU-Ability to rapidly assess health needs following a disaster and develop and communicate health information to prevent further injuries/casualties following a disaster (Public Health)

Table A.3 identifies financial tools or resources that Boulder County could potentially use to help fund mitigation activities.

Table A.3. Boulder County's Fiscal Mitigation Capabilities Financial Resources	Accessible/Eligible to Use (Yes/No)		Comments
Community Development Block Grants	Yes		CDBG-DR eligible during 2013 flood recovery
Capital improvements project funding	Yes	Subject to annual appropriation by the County commissioners	
Authority to levy taxes for specific purposes	Yes	With voter approval	
Fees for water, sewer, gas, or electric services	Some	Only in Eldorado Springs, where a sewer utility is provided; the County does not provide these services elsewhere	
Financial Resources Accessible/Eligible to Use (Yes/No) Comments Impact fees for new development	No	Possible under state law, but not something County has done before	
Incur debt through general obligation bonds	Yes	With voter approval	
Incur debt through special tax bonds	Yes	With voter approval	
Incur debt through private activities	No	Possible under state law, but not something County has done before	
Withhold spending in hazard-prone areas	Yes	Allocations are at the commissioners' discretion; however, County tends to do the opposite, spending more on	

		mitigating hazards in these areas
Other	Yes	TABOR (state law) restricts the County to a 3 percent contingency fund (currently \$3.3 million) to address disasters; voter approval is required for any taxing/debt authority, including restoration of the contingency fund after it has been spent.

A.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

Boulder County (unincorporated areas) joined the National Flood Insurance Program (NFIP) on February 1, 1979, and the Community Rating System (CRS) on October 1, 1991. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in communities that provide extra measures of flood above the minimum NFIP requirements. As of January 2015, unincorporated Boulder County had a CRS class rating of 7 (on a scale of 1-10, 1 being the best). This rating provides a 15 percent discount for policyholders within a special flood hazard area (SFHA) and a 5 percent discount for those outside of an SFHA.

NFIP insurance data indicates that as of September 30, 2014, there were 975 policies in force in the unincorporated County, resulting in \$271,184,600 of flood insurance in force. Of these, 887 were for residential properties, and 355 were in A zones (special flood hazard areas).

In unincorporated Boulder County, there have been 356 historical claims for flood losses totaling \$\$16,760,878; 329 were for residential properties. Of these losses, 175 were in A zones; the remaining losses were in B, C, D, and X zones. Of the 356 claims, 249 were associated with pre-FIRM structures. As of December 31, 2011, there were two repetitive loss structures.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable County all-hazards mitigation activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

Boulder County Comprehensive Plan, 1999

The Boulder County Comprehensive Plan is the advisory document for how development gets approved in unincorporated Boulder County. The overall philosophy of the plan is that growth should be channeled to municipalities, agricultural lands should be protected, and preservation of our environmental and natural resources should be a high priority in making land use decisions. The following goals and policies from the Geology, Natural Hazards, and Fire elements directly mitigate hazards addressed in this plan.

Goals

B.2: Air, water and noise pollution; inappropriate development in natural hazard areas; and overall environmental degradation should be reduced as much as possible or eliminated in order to prevent potential harm to life, health and property.

L.1: Inappropriate development in natural hazard areas should be reduced as much as possible or eliminated in order to minimize potential harm to life, health, and property.

L.2: Efforts to mitigate existing areas at risk to the impacts of natural hazards and disasters should be made to minimize the potential for harm to life, health, and property.

Policies

Natural Hazards/General

NH 1.01: The total economic, environmental and social costs associated with natural hazards should be reduced first, by avoiding potential hazard situations/areas; second, by applying environmentally appropriate mitigation in areas that cannot be avoided; and, third, by prevention measures accompanied with education and incentives for mitigation.

NH 1.02: Natural hazards potentially affecting the county should continue to be identified and made known to the public and public officials. The county should promote a high level of public awareness about the risks of these identified hazards which may impact people, property, and the environment. The county should be an informational resource to Boulder County citizens on issues and data related to natural hazards.

NH 1.03: The county should ensure to the extent possible that land use activities do not aggravate, accelerate, or increase the level of risk from natural hazards.

NH 1.03.01: Development activities should be designed to minimize alteration of the natural landform to the greatest extent possible, thus reducing slope instability and drainage problems.

NH 1.03.02: Areas (including any structures) around a proposed project should be protected from the potential adverse impacts caused by the project. These adverse impacts include, but are not limited to: a) disturbance of existing vegetation, which can lead to accelerated erosion and sedimentation; b) aggravation or acceleration of existing potential hazards (e.g., rockfall, flooding, sediment accumulation, expansive soils).

NH 1.04: The level of risk from natural hazards should be reduced through positive county action such as guiding development away from areas prone to natural disturbances, mitigating existing development from hazards, and considering the impact on ability to provide emergency services.

NH 1.05: Upon county review of a new development proposal, all impacts and concerns should be considered, but safety and environmental concerns should take precedence over aesthetic concerns.

NH 1.06: Recognizing that natural hazards cross jurisdictional boundaries, planning efforts should be promoted that foster cooperation and coordination among agencies and organizations involved in the mitigation of the risks associated with the hazards.

Natural Hazards/Geologic Hazards and Constraints

NH 2.01: Development in designated Geologic Hazard Areas (shown on the Geologic Hazard & Constraint Areas

Map) should be discouraged. Development should only be allowed in these designated hazard areas when adequate mitigation or elimination of the potential hazards can be demonstrated.

NH 2.01.01: The county shall strongly discourage intensive uses in Major Hazard Areas as identified in the

Geologic Hazard & Constraint Areas Map. NH 2.01.02: The county shall discourage intensive uses in Moderate Hazard Areas as identified in the Geologic Hazard & Constraint Areas Map. NH 2.01.03: Where in the public interest it may be desirable to permit intensive uses, the county shall direct such uses toward Geologic Constraint Areas rather than toward Geologic Hazard Areas as identified in the Geologic Hazard & Constraint Areas Map. NH 2.01.04: The county shall require the evaluation of all geologic hazards and constraints where such hazards or constraints may exist in unincorporated areas of the county as related to new intensive uses. Such evaluations shall be conducted by either a member of the American Institute of Professional Geologists, a member of the Association of Engineering Geologists, an individual registered as a geologist by a state, or a “professional geologist” as defined in C.R.S. 34-1- 201(3). Such evaluations should incorporate analytical methods representing current, generally accepted, professional principles and practice.
Natural Hazards/Erosion
NH 3.01: Erosion from development and other land use activities should be minimized, and disturbed or exposed areas should be promptly restored to a stable, natural, and/or vegetated condition using native plants and natural materials.
NH 3.02: Drainage from development or any alterations to historic drainage patterns shall not increase erosion either on site or on adjacent properties.
Natural Hazards/Flooding
NH 4.01: The county should strongly discourage and strictly control land use development from locating in designated floodplains, as identified in the Boulder County Zoning Maps.
NH 4.02: The county should strongly discourage and strictly control land use development from locating in areas below dams, spillways, and levees that would require the State Engineer to upgrade the classification of these structures.
NH 4.03: Critical facilities (schools, churches, hospitals, and other facilities as defined by the Federal Emergency Management Agency, FEMA) should be sited outside the delineated floodplain areas.
NH 4.04: The county, either individually or in partnership with others, should examine alternatives for acquiring and/or relocating existing structures prone to flooding.
NH 4.05: The county should continue to develop and refine the countywide Pre-Disaster Flood Mitigation Plan.
NH 4.06: The county will continue to participate and implement the Community Rating System program as part of the National Flood Insurance Program.
Natural Hazards/Wildfire
NH 5.01: The county recognizes the wildland urban interface as an area particularly at risk to wildland fires or wildfires.
NH 5.02: Fire should be recognized as a natural and/or human-caused occurrence with certain benefits to the ecosystem. The county should strive towards balancing the natural processes of the ecosystem with development concerns so that residents may co-exist in a fire-dependent ecosystem.
NH 5.03: Development/site plan reviews in areas identified to be at risk of wildfires should address site location, building construction and design, landscaping/defensible space/fuel management, access and water availability. These factors should be analyzed from the standpoint that wildfires may present a hazard to development and/or development may present an ignition hazard to the forest.
NH 5.04: Boulder County should continue to encourage interjurisdictional and interagency cooperation to further the goals of protection of life and property from wildfires. The Boulder County Wildfire Mitigation Group should continue to work cooperatively to develop and implement programs to reduce the hazard of wildfire. This should include the following subject areas: public education and awareness, fuel reduction and

prescribed burn programs, ecosystem/vegetation management, Wildfire Hazard Identification and Mitigation System, (WHIMS), codes and regulations, and pre-suppression.
NH 5.05: Boulder County should be surveyed and mapped to locate the extent of wildfire hazards and areas at risk using the Wildfire Hazard Identification and Mitigation System (WHIMS).
NH 5.06: Accepted methods of forest land ecosystem management should be used to reduce all severe wildfire hazard areas to a low or moderate rating, particularly in those areas inhabited with human development as defined by WHIMS.
NH 5.07: The county should encourage private and public landowners to manage their forests to preserve the forests' ecosystem processes by developing and maintaining a diversity of species, ages, and stand densities to serve as a natural deterrent to pest and fire outbreaks. The county should implement measures to guard against the danger of fire in developments within and adjacent to forests or grasslands.
NH 5.08: The county should continue to work in partnership with the local fire protection districts and departments in
Policies improving fire protection services to address the increasing concerns of wildfire and the increase in development in the mountainous areas of the county.
Natural Hazards/Seismicity
NH 7.01: Efforts should be made to keep apprised of new siting and building standards that are predicated on potential impacts from seismic events such as earthquakes.
Natural Hazards/Extreme Weather Conditions
NH 8.01: Efforts should be made to keep apprised of new siting and building standards that are predicated on potential impacts from extreme weather conditions such as high winds, heavy snows/hail, lightning, and occasional and irregular temperature extremes.
Fire Protection
FP 1.01: The county shall encourage fire protection districts in Boulder County to adopt, implement and enforce similar fire codes.
FP 1.02: The county shall encourage the provision of a fire coordinator to offer technical assistance concerning fire code and related matters to fire departments and county departments upon request.
FP 1.03: The county shall encourage each fire department to clearly define the level and type of service which it provides and to move toward development and adoption of a fire protection master plan as described in policy.
FP 1.04: The county shall support the development of fire protection master plans by individual departments, and, where appropriate, by geographically related groups of fire departments for the purpose of defining and potentially improving the level of service provided, eliminating unnecessary duplication, fragmentation, or competing services, and encouraging the consolidation of fire departments or districts.
FP 1.05: The Boulder County Land Use Code shall require development proposals to include an evaluation of the impact of the proposal upon the capability of the affected fire department to maintain its appropriate level of service to existing development in its response area or district and to adequately serve the proposed new development.
FP 1.06: The county shall incorporate into the Boulder County Land Use Code, in so far as possible, design and development standards and requirements which will result in the future provision of fire protection that is efficient and of an appropriate level.
FP 1.07: The county shall support the acquisition, development and maintenance, and utilization of accurate information for fire protection planning purposes, e.g., response time and fire protection category maps, wildfire hazard and risk data, land use patterns, and departmental capabilities, etc.
FP 1.08: Recognizing the value of fire protection districts in providing fire prevention inspection and investigative functions in the unincorporated areas of the county, the county shall encourage volunteer

departments to consider reorganizing as fire districts or annexing their territorial area into existing fire protection districts.
FP 1.09: The county shall encourage cooperation and the development of agreements between all levels of government and the various agencies providing fire protection services for the purpose of most efficiently utilizing the resources of each entity.
FP 1.10: The county shall recognize the value of organizations such as the Boulder County Firefighters' Association as resources for guidance and referral on fire protection and emergency services issues, for facilitating cooperation between fire departments, emergency service agencies, other units of government, and the public.

Due to Boulder County's strong emphasis on the environment and the County's natural resources, a number of other elements contain goals and policies that indirectly mitigate hazards addressed in these plans. The Environmental Resources and Open Space elements, in particular, mitigate hazards by protecting valuable natural resources (e.g., wetlands, riparian areas).

Boulder County Land Use Code

The Boulder County Land Use Code was adopted in 1994 as a comprehensive regulatory document that applies to all land within the unincorporated areas of Boulder County. Its purpose is to protect and promote the health, safety, and general welfare of the present and future inhabitants of Boulder County and to guide future growth, development, and distribution of land uses within Boulder County. The code defines zoning districts where uses and their intensities are defined. In addition, it establishes the process for subdivisions, site plan review, development standards, and other land use procedures. Among the regulations are the following, which directly mitigate natural hazards.

Article 4-400 Floodplain Overlay District—This regulation establishes an overlay district that limits development, encroachment, use, or alteration in the floodway and the floodfringe; determines when a floodplain development permit is needed and application requirements; sets standards for permit review; establishes requirements for floodproofing and elevation; and designates the Boulder County engineer as the administrator of these requirements (i.e., floodplain manager). The location and boundaries of the district are designated by a number of reports, which are listed in the code.

- **Article 4-800 Site Plan Review**—This regulation calls for the administrative review for certain proposed developments that are considered likely to significantly impact important ecosystems, agricultural lands, surrounding land uses and neighborhoods, and infrastructure needs and demands, and which may be unsafe due to natural hazards. Such a review will allow significant adverse impacts to be identified, evaluated, and avoided or acceptably mitigated through the imposition of reasonable conditions.

- **Article 7-200 Development Design**—This regulation requires development design to eliminate or mitigate the potential effects of hazardous site conditions, lots to be laid out to provide positive drainage away from all buildings, individual lot drainage to be coordinated with the general storm drainage pattern for the area, and drainage to be designed to avoid concentration of storm drainage from any lot to an adjacent lot. Guidelines that should be followed to the greatest extent possible include designing development to preserve the natural terrain, drainage, existing topsoil, and vegetation; to maintain stands of trees or other vegetative cover to reduce the effects of winds on buildings; to include xeriscaping instead of traditional landscaping; and to coordinate with the stormwater drainage and flood control systems.

- **Article 7-900 Drainage**—This regulation establishes requirements for storm drainage systems, drainage easements, areas of high ground water, soil erosion and sedimentation control plans, and stormwater management.
- **Article 7-1100 Fire Protection**—This regulation sets standards for the provision of fire protection services. It recognizes the potential need for additional fire precaution measures in identified fire hazard areas.
- **Article 8-200 Regulation for Areas and Activities of State Interest**—Among the purposes of these regulations are to ensure that development in natural hazard areas minimizes significant hazards to public health or safety or to property or the environment and to protect the public health, safety, welfare, and the environment.
- **Article 19-300 Procedures Following Disasters, Front Range Extreme Rain and Flood Event (September 2013)**—Among the purposes of these regulations are to ensure that there is an appropriate balance between citizens being able to rebuild their homes and businesses and resume their post-disaster lives, while assuring that the ongoing recovery effort is well planned in anticipation of the possibility of history repeating or exceeding itself.

As with the Boulder County Comprehensive Plan, a number of the land use regulations also indirectly mitigate hazards. These include the planned development district regulations, which promote the more efficient use of land so as to preserve and enhance the natural characteristics and unique features of a property (e.g., using conservation easements to protect valuable natural resources from development), among other things.

Floodplain Management Regulatory / Current & Future Conditions

Floodplain management regulations must be sufficient for current and future conditions. These measures must account for changes in hydrology and hydraulics due to changing conditions within the watershed including climate change.

Comprehensive Creek Planning Initiative

In response to the damage brought about by the flooding of September, 2013, Boulder County created the Comprehensive Creek Planning Initiative (CCP). The CCP is helping the County move forward with long-term creek recovery by initiating watershed-level master planning processes throughout the County. Master Plans will assist in rebuilding efforts by providing post-flood analysis of flows, facilitating key decisions about creek alignment and identifying actions for stream restoration and flood risk management. The master planning process will be an open and collaborative effort among public agencies, property owners, ditch companies, stakeholders and the public. The watersheds included in this effort are Boulder Creek, Coal & Rock Creeks, Fourmile Creek, Lefthand Creek, Little Thompson River, South Boulder Creek and St. Vrain Creek.

Flood Studies for Major Drainages

An element of Boulder County's long term flood recovery response to the event of September, 2013 is an evaluation through the Master Plans of the need for updated flood studies. All of the major drainages in the county have flood studies that are adopted by the County, the State of Colorado, and FEMA. The drainages with studies currently adopted by the county include South Boulder Creek, Boulder Creek, Fourmile Creek, Lefthand Creek, James Creek, St. Vrain Creek, Little Thompson River and a collection of

significant drainages that flow through the City of Boulder. Most of the studies were completed in the late 1970s and early 1980s.

The drastic changes to the physiography of the watersheds brought about by the September, 2013 flood have been a significant motivator behind the planning efforts for updated flood studies. Updated flood studies are also necessary due to natural, gradual changes in the climate, hydrology, and geomorphology of the region and the local watersheds. As of November, 2014 the following creek reaches are being considered for new studies:

- Boulder Creek – a 7-mile reach from the western boundary of the City of Boulder to a point roughly 3500-ft downstream of the 61st St. bridge – coordinated by the City of Boulder.
- Fourmile Creek – the entire 14-mile length that runs alongside Fourmile Canyon Dr. – separate portions of the reach to be studied and modeled as a part of the flood recovery road engineering project.
- Fourmile Canyon Creek – a 1.5-mile reach beginning at the western boundary of the City of Boulder and progressing 1.5 miles upstream – to be studied and modeled as a part of the flood road recovery engineering project.
- Gold Run Creek (Fourmile Creek tributary) – a 1.8-mile reach beginning at the confluence with Fourmile Creek – separate portions of the reach to be studied and modeled either as a part of the flood recovery road engineering project or the master plan as mentioned above.
- Geer Creek (Lefthand Creek tributary) – a 1.4-mile reach beginning at the confluence with Lefthand Creek – to be studied and modeled as a part of the flood recovery road engineering project.
- James Creek – a 4.6-mile reach beginning at the confluence with Lefthand Creek – to be studied and modeled as a part of the flood recovery road engineering project.
- Lefthand Creek – an 11-mile reach beginning upstream of the Hwy. 36 bridge and progressing 11 miles upstream – to be studied and modeled as part of the flood recovery road engineering project.
- St. Vrain Creek – Two adjacent reaches totaling 8.5-miles beginning at the Boulder / Weld County line and progressing upstream to the Hygiene Rd. bridge – coordinated as separate projects by the City of Longmont.
- St Vrain Creek – a 3.7-mile reach from the Hygiene Rd. bridge upstream to the Hwy. 36 bridge – studied and modeled as a part of the master plan as mentioned above.
- St. Vrain Creek / N. St Vrain Creek – a 2.8-mile reach from the Hwy. 36 bridge upstream to the western boundary of the Town of Lyons – study coordinated by the Town of Lyons.

- N. St Vrain Creek – a 4-mile reach from the western boundary of the Town of Lyons upstream to the Longmont Dam Rd. bridge – study coordinated by the Colorado Department of Transportation.
- N. St. Vrain Creek – a 1.4-mile reach from the Longmont Dam Rd. bridge progressing 1.4-miles upstream – to be studied and modeled as a part of the master plan as mentioned above.

Storm Drainage Criteria Manual

During the September, 2013 flood, many mountain stream crossings (both public and private) were washed out, eliminating access to many properties in Boulder County. In the year following the flood, rebuilding presented a significant challenge, in part due to impossible and in some cases ambiguous requirements in the Boulder County Storm Drainage Criteria Manual (SDCM) which was prepared in 1984.

Boulder County Transportation Department retained the services of the engineering and emergency management consulting firm, Dewberry, to assist with revisions to the SDCM. The suggested changes detailed in Dewberry's report will result in more resilient private access design and are designed to maintain the same level of safety as the current criteria, but in a way that is more feasible for mountain environments. The revisions to the SDCM were adopted on November 20, 2014.

Boulder County Parks and Open Space Management and Parcel Acquisitions

Boulder County Parks and Open Space strives to acquire lands that meet the following criteria:

- Land threatened by development that is near or adjacent to existing open space
- Prime agricultural land
- Wildlife habitat
- Riparian and scenic corridors
- Land that could provide trail connections

While lands within riparian and scenic corridors is called out as a specific category of properties sought by the Open Space Acquisitions program, the other four categories can include properties within flood hazard zones as well. Therefore, keeping flood hazard zones free of development by acquiring more properties for open space use may be accomplished through the multifaceted objectives of the program.

In October, 2012, Boulder County Parks and Open Space published the Boulder County Parks and Open Space 2015 Vision Statements. Of the seven stated goals, the first is, "To preserve rural land." Of the two objectives therein, the first is to: "Preserve 1,500 additional acres and associated water rights, focusing on key/strategic parcels, trail corridors/connections (including regional), riparian corridors and wildlife habitat." As of November, 2014, only a report of the 2013 calendar year was available. In 2013, a total of 603.33 acres of new open space either by direct purchase or Conservation Easement, 251.63 acres of which protect riparian habitat. As Boulder County Parks and Open Space continues to work

toward its goal of a total of 1,500 acres of new open space preservation by 2015, it is clear that riparian habitat and other lands within flood hazard zones will continue to be preserved as well.

Other

Boulder County is party to a number of intergovernmental agreements (IGAs), contracts between two or more jurisdictions promising to follow a jointly developed growth plan. These IGAs usually identify areas where growth can best be accommodated and, conversely, where it would be counterproductive to Boulder County's goals and policies as set forth in the Boulder County Comprehensive Plan.

Boulder County's Storm Drainage Criteria Manual regulates storm drainage design in unincorporated Boulder County. It provides minimum design and technical criteria for the analysis and design of storm drainage facilities and requires that all subdivision, resubdivision, planned unit development, or any other proposed construction shall include adequate storm drainage analysis and appropriate system design.

The Boulder County Wildfire Mitigation Group facilitates communication between all parties with an interest in wildfire mitigation; coordinates actions among the parties that could help minimize loss of life and property from future wildfires; and acts cooperatively in addressing the issues by working together in effective partnerships.

The Boulder County Wildfire Mitigation Group assists in land use reviews and wildland-urban interface code development to encourage Firewise development.

Boulder County Public Health has a West Nile virus prevention plan.

Boulder County Public Health Emergency Preparedness Program is working with other public health officials, local leaders, and emergency management to develop and practice plans for the protection of the community from pandemic flu.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

- The Boulder County Transportation Department maintains elevation certificates, which are used to provide elevation information necessary to ensure compliance with community floodplain management ordinances, to determine the proper insurance premium rate, and to support requests for letters of map amendment or revision. FEMA elevation certificates are required to be completed for all improvements in a floodplain (approved under a floodplain development permit) that are classified as new construction or a substantial improvement.
- The Boulder County Wildfire Mitigation Group developed mitigation grants to assist homeowner associations and fire districts with their fire mitigation efforts.
- The Boulder County Wildfire Mitigation Group created the Boulder County Chipping Reimbursement Program to subsidize costs of chipping and to aid in slash collection and disposal.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

- Over 65 percent of land in Boulder County is protected from development by Boulder County and federal, state, and local agencies, either through conservation easements or land ownership. Boulder County Parks and Open Space acquires land in a variety of different ways using a variety of funding sources to shape and buffer urban areas; preserve critical ecosystems, cultural resources, and scenic vistas; provide access to lakes, streams; and other public lands; conserve forests, agricultural land, and water resources; and protect areas of environmental concern. The Environmental Resources Element update to the Boulder County Comprehensive Plan adopted in November, 2014 identifies resources and natural functions that exist and also that are at risk within the County.
- The Boulder County Wildfire Mitigation Group coordinates prescribed fire programs among the various fire management entities within Boulder County.
- The Boulder County Wildfire Mitigation Group supports fuel reduction work through the use of fire mitigation crews and AmeriCorps crews.
- The Boulder County Parks and Open Space Forestry Division uses a variety of management techniques, such as thinning, prescribed burns, insect and disease treatment, and other techniques to mitigate wildfire.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

- The Boulder County Sheriff's Communications Center is responsible for the all-hazards warning siren system used to alert citizens to potential danger. There are approximately 30 outdoor warning sirens in place throughout Boulder County. System warning tests are conducted on the first Monday of each month from April through August and are intended to ensure that all systems and procedures are working properly during the season of peak flood danger. Some sirens have voice capability and the voice message will immediately follow the siren signal to inform the public of the situation and what actions should be taken.
- Boulder County has a flood warning and detection system. This system includes a flood forecasting and warning system comprised of a series of real time rain gauges monitored on a 24/7 basis, in coordination with the Urban Drainage and Flood Control District. These gauges automatically transmit data to a computer in the Boulder Communications Center that sounds an alarm when significant amounts of rainfall occur and when rising stream levels are detected. A flood warning plan has been developed for the Boulder Creek drainage basin, which is exercised and updated annually.
- The Citizens Alert System is a 24-hour alert and warning system toned with a voice warning message from the Boulder Regional Communications Center. This system is currently in many nursing homes, businesses, and homes and in all Boulder Valley and St. Vrain Schools and administrative offices. It is used to alert and warn of any natural or manmade disaster.
- The Metropolitan Emergency Telephone System (METS) is a specially designed telephone system for alerting law enforcement, other response agencies, and Denver media of emergency situations. The particular value of METS to the Boulder Regional Communications Center is the

ability to instantly notify all Denver media of any life-threatening situations in Boulder County that can be immediately broadcast on all Denver radio and television stations. Since many Boulder County residents watch Denver television and listen to Denver radio stations, this is a very valuable warning system for Boulder County and its municipalities.

- Cable television programming on all television channels can be immediately interrupted for any emergency that has a significant effect on public safety or for any unusual situation that requires evacuation. The screen can be blanked out and the emergency message transmitted.
- In January of 1997, the Federal Communications Commission (FCC) replaced the Emergency Broadcast System (EBS) with the Emergency Alert System (EAS). This digital system works with both new and established communications technologies, including satellite, broadcast, and cable systems. The EAS helps to make the disaster warning system more effective by emphasizing speed, reliability, and efficiency. It is designed to reduce property damage, injuries, and deaths resulting from natural and manmade disasters. There are eight Boulder County EAS stations according to the Denver Metro–Local Area 3 plan. The EAS can be activated locally by the emergency management director, Boulder County sheriff, and the manager of the Boulder Regional Communications Center. EAS messages can be broadcast through speakerphones in all County buildings to alert staff and the public that may be present of any emergency or need to evacuate. In addition the County posts these alerts on the County web site and distributes them via email.
- NOAA Weather Radio All Hazards is a service of the National Oceanic and Atmospheric Administration (NOAA). During severe weather, National Weather Service forecasters can interrupt the routine weather broadcasts and substitute special warning messages. Special weather radio receivers are available for purchase at local electronics stores. Although NOAA classifies coverage in Boulder as reliable, the signal cannot be received in the canyon areas.
- The National Warning System consists of private line voice circuits. The detection systems of the North American Air Defense Command (NORAD), and other sources, provide the information from which NORAD commanders determine the probability or imminence of attack. At the present time, it is used mostly by the National Weather Service in Denver to disseminate weather-related warnings to warning points in Colorado.
- The Boulder County Office of Emergency Management is responsible for the Emergency Operations Plan, which delineates task assignments and responsibilities for the operational actions that will be taken prior to, during, and following an emergency or disaster to alleviate suffering, save lives, and protect property.
- The Multiple Agency Coordinating System (MACS) is an information and resource service intended to facilitate the effective use of limited resources between jurisdictions. MACS will be activated for any emergency or disaster that requires the use of resources beyond those available to the affected jurisdiction. The MACS concept operates separately from ICS and is not involved in the control of an incident. The MACS group meets on a monthly basis.
- The Boulder County Office of Emergency Management conducts citizen emergency response team training.
- The Boulder County Wildfire Mitigation Group installs and maintains fire danger rating signs at the entrance of major canyons.
- The Boulder County Public Health Communicable Disease Division issues West Nile virus alerts.
- The Boulder County Public Health Environmental Health Division's Vector Control Program aims to prevent the spread of disease from vectors to humans. Among other things, it monitors wildlife and mosquitoes to detect the presence of West Nile virus.

- The Boulder County Mosquito Control District uses an integrated pest management approach to safely and effectively reduce mosquito populations for the purposes of protecting residents from the health risks, annoyance, and discomfort associated with mosquitoes.
- The Boulder County Public Health Emergency Preparedness Program was originally established to develop and implement a response plan for natural disasters such as floods and wildfires. It consists of a diverse team of staff, representing different department programs, to ensure that essential public health services are continuously provided in the face of disaster. The program is coordinated with other local first-responder organizations, including fire, law enforcement, emergency medical services, hospitals, and community health centers as well as other local and state agencies.
- The Boulder County Housing Authority administers the Longs Peak Energy Conservation Weatherization and Home Rehab Programs, which assist low and moderate-income homeowners in Boulder County with home health and safety retrofits.
- Emergency generators were recently installed at main Boulder County facilities.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

Floodwall at the Boulder County Justice Center
 Levee at the City of Boulder Wastewater Treatment Plant
 Levee at the University of Colorado South Campus

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

- The Boulder County Office of Emergency Management has produced an all-hazard symposium to educate the public about hazards in the County and help them prepare for emergencies.
- The Boulder County Transportation Department published the Flood Protection Handbook (in English and Spanish) for County residents that discusses what the public can do before, during, and after a flood to protect themselves and minimize losses.
- The Boulder County Transportation Department prepares and maintains a map of 100-year flood event emergency access routes.
- The Boulder County Transportation Department provides floodplain information, upon request, for properties in unincorporated Boulder County.
- Boulder County prepares and maintains a wildfire evacuation map.
- The Boulder County Wildfire Mitigation Group developed the Wildfire Hazard Identification and Mitigation System (WHIMS) for mapping fire hazards.
- The Boulder County Wildfire Mitigation Group creates education and outreach programs, including sponsoring Student Conservation Association Fire Education Corps Teams.

- The Boulder County Wildfire Mitigation Group develops brochures and information videos and has displays at the Boulder County Fair and other events.
- Add language around wildfire Partners Program
- A new forest health initiative is aimed at wildfire mitigation in western Boulder County.
- The Boulder County Public Health Communicable Disease Division provides educational materials on West Nile virus online, at events, in newspapers, and through mailings (statement stuffers).

The Boulder County Public Health provides pandemic flu preparedness checklists for healthcare providers, businesses, individuals.

Mitigation Action Plan Summary

Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
Boulder County						
Mechanical Treatment of Boulder County Parks and Open Space Forests	Boulder County Parks & Open Space	N	Y		NA	High
Restoration of Fire as an Ecological Process within Boulder County Parks and Open Space Forest	Boulder County Sheriff & Parks and Open Space	N	Y		NA	NA
Fire Management within the Boulder County Parks and Open Space (BCPOS) System	Boulder County Sheriff & Parks and Open Space	N	Y			Medium
Landscape Restoration and Climate Change Adaptation	Boulder County Parks & Open Space	N	N	TBD		
Research and Monitoring the Health and Resiliency of Boulder County Parks and Open Space (POS) Forest and the	Boulder County Parks & Open Space	N	Y	Present	NA	NA

Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
impact of POS Management						
Boulder County Community Forestry Sort Yards	Boulder County Parks & Open Space	Y	Y	On-going	NA	NA
Boulder County Youth Corps Forestry and Fire Projects	Boulder County Parks & Open Space	Y	Y	On-going	NA	NA
Boulder County Wildfire Mitigation Requirements for New Homes and Remodels		N	Y	On Going	NA	NA
Boulder County Wildfire Partners and Defensible Space	Boulder County Land-Use	N	Y	On-Going		
Boulder County Wildfire Partners and Grinder	Boulder County Land-Use	N	N	2014	NA	NA
Boulder County Forest Health Education and Outreach Program	Boulder County Land-Use	N	Y	On-going	NA	NA
October Wildfire Awareness Month	Boulder County Land-Use	N	Y	Oct 2015-2020	High	High
Boulder County Community Chipping Program	Boulder County Land-Use	Y	Y	2008 to present	High	High
Saws and Slaws	Boulder County Land-Use	N	Y	2011- present	High	High
Firewise Communities	Boulder County Land-Use	N	Y	On-going		

Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
Property Acquisition	Boulder County Land Use	N	Y	On-going		High
Elevation of Flood-prone structures	Boulder County Land Use	N	Y	On-going		High
Replace Bridge on N. 61 st St. over Boulder Creek	Boulder County Transportation	N	Y	DATE		High
Replace Bridge on N. 95th St. over Boulder Creek	Boulder County Transportation	N	Y	DATE		Medium
Replace Bridge on N. 63rd St. over Left-Hand Creek	Boulder County Transportation	N	Y	DATE		Low
Public Warning Plan Annex for EOP	Boulder OEM	N	Y	01/2015 to present	NA	High
Continue involvement in Climate Adaptation Planning Process	Boulder OEM / BOCC	Y	Y	On-going	Medium	Medium
Community Hazards Education and Preparedness Plan	Boulder OEM	N	N	July 2015- On-going	Medium	Medium
Landslide Early Warning Capability	Boulder OEM	N	N	Undetermined	NA	High
Integration of Land Use and Mitigation Plans	Boulder OEM and Boulder County Land Use	N	N	Undetermined	N/A	Medium
Install Generators at Critical County Facilities	Boulder County Admin Services	N	Y	2015	N/A	High
Strategic Continuity, Response, and Recovery Plan	Boulder County Departments and Offices	N	Y	2015-2016	NA	High

Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
BOCO Strong Regional Resiliency Plan (add Garry's CDBG-dr request)						
Update Floodplain program including maps, text and outreach	Boulder County Transportation					High
Post-flood watershed master plans	Boulder County		Y	10/01/2014		High

Mechanical Treatment of Boulder County Parks and Open Space Forests

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed:

Issue/Background:

In Boulder County, forests have been altered due to human settlement activities including suppression of natural fire; wildlife herbivory such as over grazing of aspen; and the introduction of cattle grazing, mining, and logging. The impacts of these activities include altered stand density, diversity, and structure. This has led to an overall increase in fire severity, and decrease in frequency of natural fire events. Additionally, insect outbreaks and disease are more severe in these forests types when they are stressed due to drought, and when stand densities are higher and more homogenous than under natural conditions. Reducing hazardous fuels is a key part of wildfire mitigation strategies.

Other Alternatives: Use of hand crews or no active management

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Parks and Open Space

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

There are numerous benefits associated with hazardous fuel reduction treatments. Properly designed fuel treatments can increase wildfire resiliency and resistance in dry forests and change the behavior of subsequent wildfires. Broad-scale fuel reductions can reduce the likelihood and severity of uncharacteristic wildland fire.

The dollar value of the benefits provided by Boulder County forests has not been estimated. These benefits include watershed services (water quantity and quality), soil stabilization and erosion control, air quality, climate regulation and carbon sequestration, biological diversity, recreation and tourism, forest products, cultural values, and aesthetic and passive use values.

Potential or current subject matter expertise: Current

Schedule: On-going program

Restoration of Fire as an Ecological Process within Boulder County Parks and Open Space Forest

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed:

Issue/Background:

Fire is an essential ecological process in many fire-dependent ecosystems. In large areas of the country, fire exclusion from these ecosystems has led to unhealthy forest, woodland, and rangeland conditions. These areas are at risk of intense, severe wildfires that threaten communities and cause significant damage to key ecological components. As one component of fire management, prescribed fire is used to alter, maintain, or restore vegetative communities; achieve desired resource conditions; and to protect life, property, and values that would be degraded and/or destroyed by wildfire.

Other Alternatives: No use of prescribed fire

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Sheriff's Office and Parks and Open Space

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

The value of the benefits provided by Boulder County forests has not been estimated. These benefits include watershed services (water quantity and quality), soil stabilization and erosion control, air quality, climate regulation and carbon sequestration, biological diversity, recreation and tourism, forest

products, cultural values, and aesthetic and passive use values. The use of prescribed fire enhances all of these benefits associated with healthy forests.

Potential or current subject matter expertise: Current

Schedule: On-going program

Fire Management within the Boulder County Parks and Open Space (BCPOS) System

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed:

Issue/Background:

The Boulder County Fire Management Plan seeks to increase public and firefighter safety by creating appropriate response plans, clarifying fireline roles, responsibilities, communication plans, and procedures. Boulder County Fire Management seeks to reintroduce disturbance that is within historical ranges in each life zone and forest cover type. Multiple objectives fire management, the act of employing a modified containment strategy in order to garner some ecological benefits from a naturally occurring fire, is one of the best options we have for maintaining forest health. All properties with the BCPOS system have been identified as candidates for multiple objectives suppression management, given a set of conditions and indices are met and/or present at the time of a natural, unplanned ignition.

Other Alternatives:

New or Deferred Action: New

Responsible Office: Sheriff's Office and Parks and Open Space

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

The value of the benefits provided by Boulder County forests has not been estimated. These benefits include watershed services (water quantity and quality), soil stabilization and erosion control, air quality, climate regulation and carbon sequestration, biological diversity, recreation and tourism, forest products, cultural values, and aesthetic and passive use values.

Potential or current subject matter expertise: Current

Schedule: On-going program

Landscape Restoration and Climate Change Adaptation

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed:

Issue/Background:

A combination of factors can contribute to increases in pest outbreaks under climate change. Higher temperatures can contribute to increased survival and productivity of pests, while drought and heat stress caused by climate change can make forests more vulnerable to insect outbreaks. These dynamics can affect wildfire dynamics and also provide a positive feedback to climate change. Seasonality of average and extreme temperatures and precipitation has a significant impact on wildfire timing, frequency, and magnitude. If climate change leads to warming, as anticipated, and possibly to drier conditions, this could affect the severity and frequency of wildfires, requiring alterations in fuels treatments and fire management practices.

In responses to these issues identified in Boulder County's Climate Change Preparedness Plan, Boulder County will work to restore forests on a landscape scale, across jurisdictional boundaries, from plains to peaks.

Other Alternatives: Manage forests property by property

New or Deferred Action: New

Responsible Office: Parks and Open Space

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Potential

Benefits (avoided losses): Changes in temperature and precipitation patterns and extremes can lead to the local extinction of species if key physiological thresholds are exceeded. In response to warming, many species are expected to shift their ranges northward and upward in elevation. Climate change also is likely to alter the timing of key events in species or ecosystems. Changes include earlier bud burst, flowering, emergence from hibernation, migration, and breeding. When these phenological changes affect co-occurring species, they can disrupt species interactions, including predator-prey and plant-pollinator relationships. As with native plant species, weeds are likely to be affected by climate change, but it is difficult to predict whether any given invasive species will do better or worse under elevated CO₂ and climate change.

Potential or current subject matter expertise: Current

Schedule: To be determined

Research and Monitoring the Health and Resiliency of Boulder County Parks and Open Space (POS) Forest and the impact of POS Management

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed:

Issue/Background:

In Boulder County, forests have been altered due to human settlement activities including suppression of natural fire; wildlife herbivory such as over grazing of aspen; and the introduction of cattle grazing, mining, and logging. The impacts of these activities include altered stand density, diversity, and structure. This has led to an overall increase in fire severity, and decrease in frequency of natural fire events. Additionally, insect outbreaks and disease are more severe in these forests types when they are stressed due to drought, and when stand densities are higher and more homogenous than under natural conditions. Reducing hazardous fuels is a key part of wildfire mitigation strategies.

Other Alternatives:

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Parks and Open Space

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

The value of the benefits provided by Boulder County forests has not been estimated. These benefits include watershed services (water quantity and quality), soil stabilization and erosion control, air quality, climate regulation and carbon sequestration, biological diversity, recreation and tourism, forest products, cultural values, and aesthetic and passive use values.

Potential or current subject matter expertise: Current

Schedule: On-going program

Boulder County Community Forestry Sort Yards

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed:

Issue/Background:

In 2008, Boulder County opened its first Community Forestry Sort Yard in Meeker Park. In 2010, a second yard was opened in Nederland. In addition to disposing a large volume of material, the sort yards help engage residents and empower communities to perform wildfire mitigation. It is a place where residents can discuss wildfire and forestry issues with county staff and each other—a kind of “Forestry Central.” Boulder County provides of the Community Forestry Sort Yard program free of charge (no tip/disposal fees) to the residents and private contractors of Boulder, Gilpin, and Larimer Counties.

Community Forestry Sort Yard Statistics

Year	Operational Days	Load Count	Daily Average
2008	52	1309	25.1
2009	130	2991	23.0
2010	102	2747	26.9
2011	118	3521	29.8
2012	119	6585	55.3

Other Alternatives: Mountain resident pay to dispose of slash at Western Disposal in Boulder.

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Parks and Open Space

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

Potential or current subject matter expertise: Current

Schedule: On-going program

Boulder County Youth Corps Forestry and Fire Projects

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed:

Issue/Background:

The Youth Corps provides opportunities for Boulder County teens to develop a sense of community involvement through personal accomplishment, teamwork and service to the county. Since 1996, participants, aged 14-17, have been completing projects for Boulder County departments, municipalities and towns. Corps members benefit by learning strong work habits, new skills and the value of environmental and civic stewardship. County departments, municipalities and towns benefit from the maintenance projects and tangible products such as new trails built by Corps members each summer. In 2012, BCYC teams built 111 slash piles by clearing 15 acres of logs and slash and removed and decked 30 cords of wood.

Other Alternatives: No active management

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Parks and Open Space

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

The value of the benefits provided by Boulder County forests has not been estimated. These benefits include watershed services (water quantity and quality), soil stabilization and erosion control, air quality, climate regulation and carbon sequestration, biological diversity, recreation and tourism, forest products, cultural values, and aesthetic and passive use values.

Potential or current subject matter expertise: Current

Schedule: On-going program

Boulder County Wildfire Mitigation Requirements for New Homes and Remodels

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

In Boulder County, the Land Use Department includes wildfire mitigation measures in the planning review and building permit processes. As part of the requirements for new development or remodeling of existing homes in wildfire prone areas, landowners are required to implement an approved Wildfire Mitigation Plan (WMP). This plan includes effective defensible space, ignition-resistant construction, adequate emergency access, and sufficient water supply. Boulder County programs also encourage, but do not require, residents of existing homes to create and maintain a safe home ignition zone. When building a new home, residents go through a SPR (Site Plan Review) process. This process looks at the location of the home and ensures the effective implementation of all aspects of the WMP. Boulder County adopted key regulations on the following dates: all new roofs in fire zone 1 to be class A fire retardant (1990), required a wildfire mitigation plan be approved before issuing a building permit in this zone (1993), adopted residential sprinkler requirements (1995), and required sprinklers for all new homes (2013).

Other Alternatives: No active management

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Boulder County Land Use Department

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

In the Fourmile Canyon Fire, there were 474 homes within, or adjacent to, the final perimeter of the fire: 168 of these homes were destroyed (35%); 306 homes survived (65%). Fourmile Fire homes that did not go through SPR process for WUI building code regulations (268 out of 428 homes survived; 63%). Fourmile Fire homes that did go through SPR for WUI building code regulations (38 out of 46 homes survived; 83%). Of the homes that did go through SPR for WUI building code regulations, they were approved in the following years: 1993-1994: 9 of 12 homes survived (75%), 1995-1999: 20 of 25 homes survived (80%), 2000-2010: 9 of 9 homes survived (100%). If all 474 had been through SPR and survived at an 83% rate, 87 fewer homes would have been lost saving over \$100 million dollars in insured losses.

Potential or current subject matter expertise: Current

Schedule: On-going program

Boulder County Wildfire Partners and Defensible Space

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

In September 2013, Boulder County received a wildfire risk reduction grant for its Wildfire Partners program. Wildfire Partners is a pilot program for homeowners who are willing to perform recommended mitigation measures and take necessary steps to prepare for wildfire. The program will engage leaders and early adopters who want to do the right thing and serve as models for others to follow. Participants will learn the science of home ignition and mitigation, and they will receive recognition and financial incentives from the grant for their leadership and action. The Wildfire Partners program will include an application process, on-site wildfire assessments (audits) with homeowners, site specific lists of recommended mitigation measures, follow-up inspections, and a sophisticated tracking and reporting system. The program will include a marketing and outreach campaign.

Other Alternatives: No active management

New or Deferred Action: New

Responsible Office: Boulder County Land Use Department

Priority (High, Medium, Low):

Cost Estimate:

Existing or Potential Funding: Existing

Benefits (avoided losses):

Effective mitigation will lead to more homes surviving wildfires and substantial avoided losses. Achieving a 75% home survival rate would save approximately \$65 million using the Fourmile Fire scenario.

Potential or current subject matter expertise: Current

Schedule: On-going program

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

In Boulder County, forests have been altered due to human settlement activities including suppression of natural fire; wildlife herbivory such as over grazing of aspen; and the introduction of cattle grazing, mining, and logging. The impacts of these activities include altered stand density, diversity, and structure. This has led to an overall increase in fire severity, and decrease in frequency of natural fire events. Additionally, insect outbreaks and disease are more severe in these forests types when they are stressed due to drought, and when stand densities are higher and more homogenous than under natural conditions. Reducing hazardous fuels is a key part of wildfire mitigation strategies.

Other Alternatives: No active management

New or Deferred Action: New

Responsible Office: Boulder County Parks and Open Space and Land Use Departments

Priority (High, Medium, Low):

Cost Estimate: Grinder will cost an estimated \$350,000. It will be purchased through DNR wildfire risk reduction grant.

Existing or Potential Funding: Existing

Benefits (avoided losses):

The value of the benefits provided by Boulder County forests has not been estimated. These benefits include watershed services (water quantity and quality), soil stabilization and erosion control, air quality, climate regulation and carbon sequestration, biological diversity, recreation and tourism, forest products, cultural values, and aesthetic and passive use values.

Potential or current subject matter expertise: Current

Schedule: Purchase of grinder and development of community program will take place in 2013 and 2014.

Boulder County Forest Health Education and Outreach Program

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

Boulder County's Forest Health program promotes forest sustainability through outreach and education with private landowners. We believe working with individuals and communities to encourage healthy forests is important to making a positive impact on our natural ecosystems and helping landowners achieve their specific land management goals.

Other Alternatives: Rely on Colorado State Forest Service programs

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Boulder County Land Use Department

Priority (High, Medium, Low):

Cost Estimate: Primarily staff time

Existing or Potential Funding: Existing

Benefits (avoided losses):

The value of the benefits provided by Boulder County forests has not been estimated. These benefits include watershed services (water quantity and quality), soil stabilization and erosion control, air quality, climate regulation and carbon sequestration, biological diversity, recreation and tourism, forest products, cultural values, and aesthetic and passive use values.

Potential or current subject matter expertise: Current

Schedule: On-going program

October Wildfire Awareness Month

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

In the wake of the Fourmile Canyon Fire, Boulder County declared October Wildfire Awareness Month in 2011. Six additional Colorado counties designated October as Wildfire Awareness Month in 2012. The idea for Wildfire Awareness Month came from the Citizen Advisory Team for our Community Wildfire Protection Plan. The month serves many purposes for Boulder County:

- To help heal from the impacts of the Fourmile Canyon Fire by honoring the hard work that our residents and firefighters do to prepare, suppress and recover from wildfires;
- To educate and engage our residents by giving them opportunities and tools to complete wildfire mitigation and defensible space work on their lands;
- To recognize that wildfires are a fact of living in the west, but there are things that we can do to decrease the severity of these fires and their impact to humans and the environment;
- To build upon National Fire Prevention Week, which also is in October.

Fire awareness and preparedness is a year-round endeavor, but this initiative established an annual, dedicated time period for Boulder County to focus our attention and resources around wildfire awareness. The month includes a long list of community projects and educational events, including regional workshops, volunteer projects, educational tours and hikes, community chipping events, and a wildfire mitigation challenge.

Other Alternatives: No action

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but October Wildfire Awareness Month has been celebrated since 2011)

Responsible Office: Boulder County Land Use Department

Priority (High, Medium, Low): High

Cost Estimate: \$1,000/year plus staff time

Existing or Potential Funding: Existing

Benefits (avoided losses): Projects to create d-space will help reduce future home loss.

Potential or current subject matter expertise: Current

Schedule: On-going program

Boulder County Community Chipping Program

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

Boulder County initiated its community chipping reimbursement program in 1993. Since then the County has distributed \$15,000 per year in funding for select projects. Project partners have included fire protection districts, local governments, homeowners associations, and community groups. Historically, Boulder County has reimbursed up to 40% of the costs of approved chipping efforts. Recent changes to the program have focused on education of residents prior to chipping and community chipping programs that promote neighbors working with neighbors.

Boulder County encourages all residents to perform effective wildfire mitigation on their land and to be active stewards of their backyard forests. One of the biggest obstacles homeowners face when managing their backyard forest is disposing of slash. This community chipping program helps address the problem of slash disposal and encourages community members to work together to accomplish their shared goals.

Other Alternatives: No county program to support chipping projects

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, this action is a long-standing, on-going program)

Responsible Office: Boulder County Land Use Department

Priority (High, Medium, Low): High

Cost Estimate: \$15,000 per year

Existing or Potential Funding: Existing

Benefits (avoided losses): Chipping projects to create d-space will help reduce future home loss.

Potential or current subject matter expertise: Current

Schedule: On-going program

Saws and Slaws

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2 and 4

Issue/Background:

Saws and Slaws, short for chainsaws and coleslaws, is a model community involvement program. The idea is simple: On a select day, dozens of neighbors come together to reduce hazardous fuel on a handful of properties. After four hours of cutting and hauling logs and slash to a designated site for chipping, these volunteers enjoy a delicious potluck lunch. The chipper is operated by a forestry contractor, who assists the mitigation efforts on the day of the event. All the recruitment, planning, organizing, and follow-up work is performed by community volunteers. Events rotate to different sites over the course of the year. Since defensible space work is never done, sites can be revisited in future years. Saws and slaws is the 21st century equivalent to an Amish barn raising. It is a great way for community members to meet, improve the health of their backyard forests, and help protect their homes (and their neighbors' homes) from wildfire.

Other Alternatives: Individuals work only on their own property

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but in reality, Saws and Slaws started in 2011.)

Responsible Office: Community groups with assistance from Boulder County Land Use Department

Priority (High, Medium, Low): High

Cost Estimate: Funded through chipping reimbursement program and DNR grant. Saws and Slaws has grown every year since 2011. 2014 funding from Boulder County will depend on grant requests; budget estimate is \$25,000.

Existing or Potential Funding: Existing

Benefits (avoided losses):

Community projects to create d-space will help reduce future home loss. Building social capital and strengthening community resiliency will assist with mitigation, response, and recovery efforts.

Potential or current subject matter expertise: Current

Schedule: On-going program

Firewise Communities

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

Firewise Communities is a successful, national program to mitigate the risk of wildfire. In 2012, there were 802 Firewise Communities and 38 Firewise Communities in Colorado. However, there were no Firewise Communities in Boulder County despite all the wildfire mitigation work that has taken place.

Other Alternatives: No Firewise Communities in Boulder County

New or Deferred Action: New (action not listed in the 2008 Multi-Hazard Mitigation Plan, but efforts to promote Firewise Communities started in 2012)

Responsible Office: Colorado State Forest Service with assistance from Boulder County Land Use Department

Priority (High, Medium, Low):

Cost Estimate: 3,000

Existing or Potential Funding: Existing

Benefits (avoided losses):

Designation of Firewise Communities and the ensuing mitigation action will help reduce future home loss.

Potential or current subject matter expertise: Current

Schedule: On-going program

Property Acquisition

Hazards Addressed: Flooding, Landslide/Mud and Debris Flow/Rock Fall, Subsidence,

Mitigation Goal or Objective Addressed: Goals 1, 2, and 4

Issue/Background:

One of the best ways to prevent repetitive loss is to remove development from hazardous locations. The purpose of the property acquisition program is to purchase properties, remove structures and other improvements, and return the property to its natural state. Depending on the location and site characteristics, some properties may be used as parks, picnic areas, or trailheads in the future while other properties may remain vacant open space.

Other Alternatives:

None.

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished. NEW?

Responsible Office: Boulder County Land Use

Priority (High, Medium, Low): High

Cost Estimate: The cost will vary based on the number of eligible properties identified for each funding opportunity. For HMGP from the 2013 extreme rain and flooding disaster, Boulder County has identified approximately \$17,000,000 in eligible acquisition projects. County will pursue developing a long term acquisition strategy to reduce risk as properties become available.

Existing or Potential Funding: Possible funding sources include FEMA's Hazard Mitigation Grant Program (HMGP), FEMA's Pre-Disaster Mitigation (PDM), Community Development Block Grant-Disaster Recovery (CDBG-DR), Urban Drainage and Flood Control District, and/or budgeting money into the Boulder County annual budget for regular acquisitions of properties in hazardous locations.

Benefits (avoided losses): Benefits include preventing future loss to life and property by removing structures from hazardous locations. There will also be a cost savings to NFIP for removing insurable structures from the floodplains.

Property Elevation

Hazards Addressed: Flooding, Landslide/Mud and Debris Flow/Rock Fall, Subsidence,

Mitigation Goal or Objective Addressed: Goals 1, 2, and 4

Issue/Background:

Another way to prevent repetitive loss is to elevate vulnerable structures above the base flood elevation. The purpose of the property elevation program is to assist property owners with the expense of retrofitting an existing structure to comply with floodplain regulations. Boulder County's regulations requires a structure be elevated at least two feet above the base flood elevation in order to be considered compliant with the floodplain regulations in Article 4 of the Land Use Code. Elevating structures doesn't alleviate the risk, particularly to first responders, however, it can result in more resilient communities. In addition, homeowners may find significant savings to flood insurance premiums if their house is compliant with local regulations.

Other Alternatives:

None.

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished. NEW?

Responsible Office: Boulder County Land Use

Priority (High, Medium, Low): High

Cost Estimate: The cost will vary based on the number of eligible properties identified.

Existing or Potential Funding: Possible funding sources include FEMA's Hazard Mitigation Grant Program (HMGP), FEMA's Pre-Disaster Mitigation (PDM), and/or Community Development Block Grant-Disaster Recovery (CDBG-DR) funding.

Benefits (avoided losses): Benefits include preventing future loss to property by elevating the first flood of habitable structures at least two feet above the base flood elevation. There will also be a cost savings to NFIP for removing insurable structures from the floodplains.

Install Generators at Critical County Facilities

Hazards Addressed: Dam and Levee Failure, Earthquake, Flood, Hailstorm, Landslide/Mud and Debris Flow/Rock Fall, Lightning, Severe Winter Storm, Subsidence, Tornado, Wildfire, Windstorm

Mitigation Goal or Objective Addressed: Goals 1, 2, and 4

Issue/Background:

Boulder County maintains facilities throughout the county for a variety of purposes. Some of those facilities (such as the road maintenance facilities, for example), are vitally important due to their primary function while other facilities (such as the Fair Grounds, for example) are important because they are staging areas or temporary locations for critical facilities, should those facilities be compromised during a disaster. In order to assure continuity of services during disasters, it would be helpful to have generators installed so that these facilities can continue to function during prolonged power failures.

Other Alternatives:

None.

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished. NEW?

Responsible Office: Boulder County Administrative Services

Priority (High, Medium, Low): High

Cost Estimate: Need cost estimate form grant application.

Existing or Potential Funding: Possible funding sources include FEMA's Hazard Mitigation Grant Program (HMGP), FEMA's Pre-Disaster Mitigation (PDM), Community Development Block Grant-Disaster Recovery (CDBG-DR), and/or budgeting money into the Boulder County annual budget to add generators to critical facilities incrementally.

Benefits (avoided losses): Benefits include continuity of service during emergencies where power outages may be a result of the disaster experienced.

Hazards Addressed: All Identified County Hazards

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background: The County has gained experience and a significant level of expertise after suffering through several major disasters over the past five years. The ability of the County to respond in a nimble and agile manner depends on continuing efforts at preparing and planning for events.

Natural disasters can impact small areas and have minimal impacts on some County operations, or can be at a large scale and have major implications to County operations and budgets. Preparedness and planning have to account for the entire range of possibilities. Improving the methods, organization, and processes and policies will support an effective County response to disasters and provide for more efficient deployment of County resources and programs.

Continuity of Operations Plans (COOP), Emergency Operations Plans, and Preparedness and Recovery Plans have all been key to the County's ability to effectively respond. However, the lessons learned from the floods of September 2013 need to be fully captured and operationalized through updating and connecting the various components of response and recovery plans.

Other Alternatives: None.

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished. NEW

Responsible Office: Boulder County Office of Emergency Management coordinating with all County Departments and Offices.

Priority (High, Medium, Low): High

Cost Estimate:

Existing or Potential Funding: Possible funding sources include FEMA's Hazard Mitigation Grant Program (HMGP), FEMA's Pre-Disaster Mitigation (PDM), Community Development Block Grant-Disaster Recovery (CDBG-DR), and/or budgeting money into the Boulder County annual budget and work plan.

Benefits (avoided losses): The Strategic Continuity, Response, and Recovery Plan prepares the County to have the organizational and procedural policies in place to fully and efficiently respond to disasters, both as an organization and for the community. Implementation and documentation of institutional learning which have occurred through experience with the flood and fire events over the past five years are critical. It is important to fully understand the scale and extent of damages and have methods in place to implement under different spectrums and types of damage.

Integration of Land Use and Mitigation Plans

Hazards Addressed: All Identified County Hazards

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background: Utilize updated data, technical expertise and community input to update and integrate County's Comprehensive Plan and All Hazards Mitigation Plan. Assure linkages and policy consistency and forge a stronger tie between Land Use decisions and policies and the Hazard Mitigation Plan. Identify short and long term policies and programs to meet integrated goals. Recognize and address potential environmental impacts of mitigation measures so ecological health is maintained.

Other Alternatives: None.

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished. NEW

Responsible Office: Boulder County Land Use and Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: The cost will be determined base on scope and timing of future work. The nature of this project is scalable and can be done as money allows to address discreet issues or if funds are available on a broad more inclusive level.

Existing or Potential Funding: Possible funding sources include FEMA's Hazard Mitigation Grant Program (HMGP), FEMA's Pre-Disaster Mitigation (PDM), Community Development Block Grant-Disaster Recovery (CDBG-DR), and/or budgeting money into the Boulder County annual budget and work plan.

Benefits (avoided losses): Boulder County has a strong record of successful land use planning and hazard mitigation and response programs. Stronger integration between plans will allow for more effective mitigation measures to be identified and implemented. Developing a program which will capture best available information in identifying and prioritizing potential hazards and which reviews and develops land use policies to avoid or successfully mitigate hazards. Program will ensure consistency and linkage across disciplines, plans and codes. Programs for fire safety, flood mitigation, building codes, water and natural resource planning will be linked and guide land use policies and capital improvement expenditures. Recovery and response will improve as hazards are avoided or mitigated lessening impacts from disasters. Linking the land use planning and emergency managers will foster ongoing relationships and community building.

Boulder County Parks & Open Space Public Infrastructure Defensible Space 2015 Project

Hazards Addressed: Wildfire

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

The mission of our **Boulder County Parks and Open Space Public Infrastructure Defensible Space 2015 Project** is to continue expanding our forest health program by including a defensible space component to the structures on our forested open space properties. This project's primary goal is to create an area between structures and oncoming wildfires where vegetation and other flammable hazards have been managed to reduce threats and allow firefighters to safely defend these structures. Important historic structures have been lost in recent wildfire events such as the Four Mile Fire. The project also protects the significant investment of public funds in the acquisition, maintenance, and restoration of the structures. In the last 10 years alone, the county has spent in excess of \$2 million dollars on preservation projects that have been implemented consistent with the Secretary of the Interior's Standards for the Treatment of Historic Places.

The structures are clustered together on 17 properties. Five properties house resident rangers and their families who are caretakers of these unique mountain parks. Two other homes are rented. In addition, many are operated as museums or interpretive sites and one is used for housing our summer artist in residence program. We anticipate that once mitigated, these properties will act as demonstration projects that partners like Boulder County Wildfire Partners can use to showcase mitigation activities and educate local community members about mitigation. They will promote wildfire mitigation in our community by "leading by example" and encouraging private landowners to do the same.

The seventeen sites are:

- 1) Betasso Homestead (12 structures)
- 2) Rocky Mountain Mammoth Mine (2 structures)
- 3) Bald Mountain (1 structure)
- 4) Hall (11 structures)
- 5) Reynolds Ranch Homestead (6 structures)
- 6) Assay Office Museum/Wall Street (6 structures)
- 7) Walker (13 structures)
- 8) Arapahoe Lode (4 structures)
- 9) Blue Jay Mine (2 structures)
- 10) Cardinal Mill (2 structures)
- 11) Caribou Ranch (12 structures)
- 12) Heil (5 structures)
- 13) Mehl (1 structure)

- 14) Oliveri (8 structures)
- 15) Fabel (1 structure)
- 16) Hassler (1 structure)
- 17) Rogers (5 structures)

Please refer to that attached property maps which detail these structures and sites.

Name of action – Boulder OEM Public Warning Plan

Hazards Addressed: All Hazards

Mitigation Goal or Objective Addressed: Design and implement a public warning hazard plan to ensure coordination of all warning systems used during an emergency or disaster.

Issue/Background: Many organizations and communities have different policies and procedures to initiate public warning systems. This plan will collect all systems and policies to ensure integrated public warning efforts.

Other Alternatives: N/A

New or Deferred Action: New Action

Responsible Office: Boulder OEM

Priority (High, Medium, Low): High

Cost Estimate: \$35,000

Existing or Potential Funding: Operational funds of OEM

Benefits (avoided losses): Provides coordinated public warning efforts during wide area disasters

Name of action – Boulder OEM Landslide Early Warning System

Hazards Addressed: Landslides and Debris Flows

Mitigation Goal or Objective Addressed: As wildfires increase, storm intensity and variations to our monsoonal season occur landslide risks go along with them. Wildfires create burn scars and this creates debris flows and increase landslide risks. In many of our greatest Colorado floods inundation events are precursors to the actual flood and the saturated ground causes landslides that dam canyon creeks exacerbating the flood and its eventual damage to residences and communities.

Issue/Background: There is not a landslide early warning plan in existence nationally. A solid plan would include soil saturation sensors to allow for anticipating when debris flows or landslides might occur. Drainage assessments to determine debris loading and volumes. USGS or CSGS high hazard area engineering assessments and pre and post event LIDAR data.

Other Alternatives: No other alternatives

New or Deferred Action: New Action

Responsible Office: Boulder OEM

Priority (High, Medium, Low): High

Cost Estimate: 2.5 million

Existing or Potential Funding: County, State, & Federal

Benefits (avoided losses): Take high hazard area data and start a community education program to develop awareness. Identify drainages that are volume loaded and will cause life and property risks and then develop early warning zones. Engineering assessments to determine trigger points and the install sensors in strategic areas to assist with identifying when public warnings should be sent.

Name of action – Boulder OEM Flood Control District System

Hazards Addressed: Flood

Mitigation Goal or Objective Addressed: The UDFCD covers only a portion of the develop areas of Boulder County. The remaining areas are not covered under such a program and thus do not have the mitigation opportunities, early warning systems and community education programs equal to those in the UDFCD. The goal is to develop a similar organization in the remaining areas of the county to develop these capabilities s wildfires increase, storm intensity and variations to our monsoonal season occur landslide risks go along with them. Wildfires create burn scars and this creates debris flows and increase landslide risks. In many of our greatest Colorado floods inundation events are precursors to the actual flood and the saturated ground causes landslides that dam canyon creeks exacerbating the flood and its eventual damage to residences and communities.

Issue/Background: There is not a landslide early warning plan in existence nationally. A solid plan would include soil saturation sensors to allow for anticipating when debris flows or landslides might occur. Drainage assessments to determine debris loading and volumes. USGS or CSGS high hazard area engineering assessments and pre and post event LIDAR data.

Other Alternatives: No other alternatives

New or Deferred Action: New Action

Responsible Office: Boulder OEM

Priority (High, Medium, Low): High

Cost Estimate: Stream and Rain Gauges \$750,000, Community Preparedness program \$50,000, predictive services \$25,000 and mitigation projects mil levy dependent.

Existing or Potential Funding: County, State, & Federal

Benefits (avoided losses): Take high hazard area data and start a community education program to develop awareness. Identify drainages that are volume loaded and will cause life and property risks and then develop early warning zones. Engineering assessments to determine trigger points and the install sensors in strategic areas to assist with identifying when public warnings should be sent.

Implementation of Watershed Master Plan Projects

Hazards Addressed: Flood

Mitigation Goal or Objective Addressed: Goals 1, 2, 3, and 4

Issue/Background:

Post-flood watershed master plans have been developed for St. Vrain Creek, Left Hand Creek, and Fourmile Creek. A similar master plan is in progress for Boulder Creek. The master plans identify restoration projects needed within the watersheds to stabilize the creeks and reduce flood risk to life, property, and infrastructure due to post-flood conditions. The three completed plans identified 49 top priority projects with cost estimates (see Table below for a list of projects).

Other Alternatives: NA

New or Deferred Action: New (Projects identified in the master plans are needed as a direct result of the September 2013 flood.)

Responsible Office: Project-dependent

Priority (High, Medium, Low): High

Cost Estimate: \$165 million for all top priority projects in St. Vrain Creek, Left Hand Creek, and Fourmile Creek

Existing or Potential Funding: Potential

Benefits (avoided losses):

The benefits of the projects identified in the watershed master plans are increased stability of the watersheds and reduced flood risk to life, property and infrastructure.

Potential or current subject matter expertise: Current

Top Tier Project Lists from WaterShed Master Plans

Watershed	Tier	Reach	Jurisdiction	Project	Base Cost	Engineering, PM, Permitting, etc.	Low Estimated Cost	High Estimated Cost	Comments	Adjacent to County Road Construction ?
Fourmile	1	1	Unincorporated Boulder County	Remove sediment aggradation from the channel near Mile Marker 1.1	\$ 9,200	\$ 3,220	\$ 12,420	\$ 14,720.00	Excavation line item?	
Fourmile	1	1	Unincorporated Boulder County	Fourmile Creek restoration project (existing CWCB Grant)	\$ 80,000	\$ 28,000	\$ 108,000	\$ 128,000.00	Unmet cost	
Fourmile	1	3	Unincorporated Boulder County	Fill and revegetate avulsion areas	\$ 44,840	\$ 15,694	\$ 60,534	\$ 71,744.00	Included full revegetation line-item. There is no Tier 2 revegetation project for this reach	
Fourmile	1	3	Unincorporated Boulder County	Install debris racks and stabilize the banks of Ingram Gulch	\$ 90,000	\$ 31,500	\$ 121,500	\$ 144,000.00		
Fourmile	1	3	Unincorporated Boulder County	Assess the stability of existing walls and modify if necessary	\$ 1,250,000	\$ 437,500	\$ 1,687,500	\$ 2,000,000.00		
Fourmile	1	4	Unincorporated Boulder County	Remove a debris jam in a high avulsion risk area near Mile Marker 7.7	\$ 140,000	\$ 49,000	\$ 189,000	\$ 224,000.00	This was included in the low flow channel restoration cost. KD provided the	

									approximate cost for just this location.	
Fourmile	1	4	Unincorporated Boulder County	Remove sediment aggregation from the channel and floodplain near Mile Markers 5.1, 5.8, and 6.3	\$ 55,500	\$ 19,425	\$ 74,925	\$ 88,800.00		
Left Hand	1	2	Longmont	City of Longmont Flood Control Phase 2		\$ -	\$ 1,000,000	\$ 3,000,000.00		
Left Hand	1	4	Unincorporated Boulder County	Brigadoon Glen	NA	NA	\$ 1,000,000	\$ 3,000,000		
Left Hand	1	6	Unincorporated Boulder County	Streamcrest	NA	NA	\$ 500,000	\$ 1,000,000		
Left Hand	1	8	Unincorporated Boulder County	2156 Left Hand Through 1934 Left Hand	NA	NA	\$ 20,000	\$ 100,000		
Left Hand	1	8	Unincorporated Boulder County	Buckingham Park to Crossing	NA	NA	\$ 500,000	\$ 1,000,000		
Left Hand	1	9	Unincorporated Boulder County	Reach 9 Box Culvert to Reach Break	NA	NA	\$ 20,000	\$ 100,000		
Left Hand	1	9	Unincorporated Boulder County	Left Hand Canyon Mountain Park*	NA	NA	\$ 100,000	\$ 500,000		
Left Hand	1	9	Unincorporated Boulder County	Below Left Hand Canyon Mountain Park to Box Culvert/Crossing	NA	NA	\$ 1,000,000	\$ 3,000,000		
Left Hand	1	10	Unincorporated Boulder County	5001 Left Hand Canyon	NA	NA	\$ 20,000	\$ 100,000		
Left Hand	1	10	Unincorporated Boulder County	4333 Left Hand Canyon	NA	NA	\$ 100,000	\$ 500,000		

Left Hand	1	11	Unincorporated Boulder County	5901 - 5001 Left Hand Canyon	NA	NA	\$ 100,000	\$ 500,000		
Left Hand	1	12	Unincorporated Boulder County	6232 Left Hand Canyon	NA	NA	\$ 20,000	\$ 100,000		
Left Hand	1	12	Unincorporated Boulder County	6897 - 6738 Left Hand Canyon	NA	NA	\$ 100,000	\$ 500,000		
Left Hand	1	13	Unincorporated Boulder County	8404-8398 Left Hand Canyon	NA	NA	\$ 100,000	\$ 500,000		
Left Hand	1	13	Unincorporated Boulder County	Glendale Gulch Drainage and River	NA	NA	\$ 100,000	\$ 500,000		
Left Hand	1	14	Unincorporated Boulder County	Left Hand Canyon Drive Road River Interface	NA	NA	\$ 20,000	\$ 100,000		
Left Hand	1	16	Unincorporated Boulder County	Lower James Canyon Neighborhood	NA	NA	\$ 1,000,000	\$ 3,000,000		
Left Hand	1	17	Unincorporated Boulder County	1029 James Canyon to Lower End of EWP Work	NA	NA	\$ 100,000	\$ 500,000		
Left Hand	1	21	Unincorporated Boulder County	Little James Creek	NA	NA	\$ 500,000	\$ 1,000,000		
Left Hand	1	22	Unincorporated Boulder County	Geer Canyon	NA	NA	\$ 500,000	\$ 1,000,000		
St. Vrain	1	3	Boulder County POS	Breach Repairs	\$ 10,273,151	\$ 3,595,603	\$ 13,868,754	\$ 16,437,042	3 sections of reach combined; includes overflow channel	
St. Vrain	1	3	Longmont	Longmont Flood Control Channel		\$ -			Funded--so not included here.	
Fourmile	2	1	Unincorporated Boulder County	Bank Protection	\$ 420,750	\$ 147,263	\$ 568,013	\$ 673,200.00		

Fourmile	2	1	Unincorporated Boulder County	Low flow channel restoration/Increase in-stream habitat	\$ 3,500,000	\$ 1,225,000	\$ 4,725,000	\$ 5,600,000.00	Per KD low-flow channel includes increase in-stream habitat costs; also includes revegetate	
Fourmile	2	2	Unincorporated Boulder County	Revegetate	\$ 10,000	\$ 3,500	\$ 13,500	\$ 16,000.00		
Fourmile	2	2	Unincorporated Boulder County	Low flow channel restoration/Increase in-stream habitat	\$ 1,834,000	\$ 641,900	\$ 2,475,900	\$ 2,934,400.00	Per KD low-flow channel includes increase in-stream habitat costs	
Fourmile	3	2	Unincorporated Boulder County	Fill and Revegetate	\$ 27,240	\$ 9,534	\$ 36,774	\$ 43,584.00	Per KD should have been in Tier 3, Reach 2. Plan needs to be updated.	
Fourmile	3	2	Unincorporated Boulder County	Fill the pre-flood channel to reduce avulsion risk		\$ -	\$ -	\$ -	Per KD- See note on the item in Row 32. This is included above (Row 32)	
Fourmile	2	3	Unincorporated Boulder County	Relocate Fourmile Creek downstream of Salina Junction	\$ 108,500	\$ 37,975	\$ 146,475	\$ 173,600.00		
Fourmile	2	3	Unincorporated Boulder County	Bank Protection	\$ 335,500	\$ 117,425	\$ 452,925	\$ 536,800.00		
Fourmile	2	3	Unincorporated Boulder County	Low flow channel restoration/Increase in-stream	\$ 5,285,000	\$ 1,849,750	\$ 7,134,750	\$ 8,456,000.00	Per KD low-flow channel includes	

				habitat					increase in-stream habitat costs	
Fourmile	2	4	Unincorporated Boulder County	Remove a temporary berm near Mile Marker 7.2 and bank protection	\$ 6,500	\$ 2,275	\$ 8,775	\$ 10,400.00	Per KD- This was included in the excavation cost for this reach. I've added the site specific cost for this location and reduced the cost of "Remove sediment aggradation from the channel and floodplain near Mile Markers 5.1, 5.8, and 6.3" accordingly.	
Fourmile	2	4	Unincorporated Boulder County	Revegetate	\$ 26,000	\$ 9,100	\$ 35,100	\$ 41,600.00		
Fourmile	2	4	Unincorporated Boulder County	Bank Protection	\$ 665,500	\$ 232,925	\$ 898,425	\$ 1,064,800.00		
St. Vrain	2	3	Unincorporated Boulder County	Stream Restoration	\$ 5,930,400	\$ 2,075,640	\$ 8,006,040	\$ 9,488,640	3 sections of reach combined-only used "Low flow/bankfull Channel Restoration"	

									line item	
St. Vrain	2	5	Unincorporated Boulder County	Longmont Dam Road Stream Restoration	\$ 7,436,061	\$ 2,602,621	\$ 10,038,682	\$ 11,897,697	Assumed full reach 5 costs	
St. Vrain	2	6	CDOT/Unincorporated Boulder County	Hwy 7 Corridor Stream Restoration Coordinated with CDOT Road Improvements	\$ 15,217,729	\$ 5,326,205	\$ 20,543,934	\$ 24,348,367	Assumed full reach 6 costs. Need to determine which portion is unincorporated Boulder County	
St. Vrain	2	7	Unincorporated Boulder County	Riverside/Raymond Stream Restoration	\$ 824,956	\$ 288,735	\$ 1,113,691	\$ 1,319,930	Assumed full reach 7 costs	
Fourmile	2	4	Unincorporated Boulder County	Low flow channel restoration/Increase in-stream habitat	\$ 5,022,500	\$ 1,757,875	\$ 6,780,375	\$ 8,036,000.00	Per KD low-flow channel includes increase in-stream habitat costs	
St. Vrain	1	4a	Unincorporated Boulder County	Apple Valley	\$ 9,832,226	\$ 3,441,279	\$ 13,273,505	\$ 15,731,562	Includes all costs for Reach 4a	
St. Vrain	1	4b	Boulder County POS	Hall Meadows/SSV	\$ 14,490,191	\$ 5,071,567	\$ 19,561,758	\$ 23,184,306	Includes all costs for Reach 4b	
St. Vrain	1	4c	Lyons	Lyons Proper	\$ 7,970,339	\$ 2,789,619	\$ 10,759,958	\$ 12,752,542.40		

Annex B: Erie

B.1 Community Profile

“Erie is a community which recognizes the importance of conserving and enhancing its historic small town character, the roots from which it grew, preserving the natural environment in which it resides; a caring community which offers its residents an environment in which to seek a high quality of life; a balanced community with a diverse range of housing, employment, educational, shopping and recreational opportunities; and a vital community which provides financial and social support for quality of life programs.”

- Town of Erie Comprehensive Plan

The Town of Erie is located in eastern Boulder County and southwest Weld County. Erie's Planning Area spans 48 square miles, extending from the north side of State Highway 52 south to State Highway 7, and between US 287 on the west and Interstate 25 to the east. Erie is approximately 35 minutes from Denver International Airport, 25 minutes to Denver and 20 minutes from Boulder. The entire Town is covered by this plan, including the Weld County portion.

The original plat for Erie was filed in 1871, following establishment of the Briggs Mine, the first commercial coal mine in Weld County. It was also in 1871 that the Union Pacific Railroad extended a spur westward from Brighton on its main line between Denver and Cheyenne. Coal from the Erie deposits was needed to fuel their huge steam locomotives. The Boulder Valley Railroad, as it was called then, opened up the northern coal fields for development. Soon coal from Erie mines was being shipped by rail to markets in Denver and as far east as Kansas City. The Town of Erie was incorporated in 1874.

B.1.1 Population

According to the Town of Erie Community Development Department, there are 7,323 households within the Town as of December 31, 2014. 3,052 of the households are located in Boulder County and 4,271 of the households are in Weld County. The majority of households (approximately 6,500) are single family homes with the remaining homes multi-family units.

Erie's population was recorded as 6,291 at the 2000 US Census. The population according to the 2010 census was 18,135. According to the Town of Erie Community Development Department, Erie's estimated 2015 population is 22,000. There are approximately 7,000 new residential units at some phase of the development process. As such, Erie is poised to reach a projected population of 40,640 by 2025. To view existing and future residential development, please visit www.erieco.gov/maps and select Residential Development Activity Map.

Select Census demographic and social characteristics for Erie are shown in Table B.1.

Table B.1. Erie's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	49.1
Female (%)	50.9
Under 5 Years (%)	8.5
65 Years and Over (%)	6.3
Race/Ethnicity (one race)	
White (%)	88.0
Hispanic or Latino (Of Any Race) (%)	7.0
Other	
Average Household Size	2.95
High School Graduate or Higher (%)	97.6

Source: 2008-2012 American Community Survey, 5-year Estimate

B.1.2 Economy

According to the 2010 Census, the industries that employed most of Erie's labor force were education, health and social services (21.5%), professional, scientific, and management, administrative and waste management services (15.7%), retail trade (13.3%) and manufacturing (12%). Select economic characteristics for Erie from the 2010 Census are shown in Table B.2.

Table B.2. Erie's Economic Characteristics

Characteristics	
Families below Poverty Level, 2010	3.6%
Individuals below Poverty Level, 2010	4.0%
Median Home Value	\$341,400
Median Household Income, 2010	\$100,288
Per Capita Income, 2010	\$36,688
Population in Labor Force	8,723

Source: U.S. Census Bureau (2010), www.census.gov

B.2 Hazard Summary

The most significant hazards for Erie are floods, expansive soils, and severe winter storm. Refer to the Vulnerability Assessment for detailed vulnerability to the flood hazard. Other hazards that could impact Erie include severe winter weather, lightning, tornado, windstorm, flooding, hailstorm, extreme heat, subsidence, dam failure, drought and earthquake. Due to its location on the plains in eastern Boulder County the Town has a slightly higher risk from tornados than other communities in this plan.

B.3 Asset Inventory

B.3.1 Property Inventory

Table B.3 represents an inventory of property in Erie based on data as of August 1, 2013.

Table B.3. Erie's Property Inventory

Property Type	Parcel Count	Total Value (\$)
Boulder County		
Residential	5,899	944,013,982
Commercial	130	25,404,868
Exempt	128	17,827,394
Agricultural	173	461,608
Industrial	13	1,272,392
Vacant	278	12,832,800
Oil & Gas	119	7,825,228
Natural Resources	16	6,400
State Assessed	37	11,769,867
Total	6,793	1,021,414,539
Weld County		
Residential		1,093,855,103
Commercial		60,016,021
Exempt		63,027,707
Agricultural		630,095
Industrial		7,868,508
Vacant		13,155,887
Oil & Gas		33,722,481
Minerals		15,130
State Assessed		4,709,660
Total		1,277,000,592
Grand Total		2,298,415,131

Source: Boulder County Assessor's Office, Abstract of Assessment 2012; Weld County Assessor's Office, Abstract of Assessment December 2012

B.3.2 Other Assets

Table B.4 is a detailed inventory of assets identified by the Town's planning team. This inventory includes critical facilities.

Table B.4. Erie's Assets

Name of Asset	Type¹	Address	Replacement Value (\$)²	Occupancy/ Capacity #	Hazard Specific Info
Town Hall/Police Station	Essential/ Public Safety, Vital	645 Holbrook Erie, CO 80516	3,015,531		
MVFPD Fire Station #6	Essential/ Public Safety	50 Bonanza Dr., Erie, CO 80516	630,758		
*New Police Station and Municipal Court	Essential/ Public Safety, Vital	County Line Road and Telleen Ave.	TBD	TBD	*Scheduled opening July 2015
Water Treatment Facility	Essential/ Utility, Hazardous Materials	2901 No. 119 th Street, Erie, CO 80516	19,389,713		Chemicals
Water Reclamation Facility	Essential/ Utility	1000 Briggs St., Erie, CO 80516	8,867,758		
North Water Reclamation Facility	Essential/ Utility	501 St. Hwy 287, Erie, CO 80516	18,000,000		
Erie Community Center	Essential/ Shelter	450 Powers St., Erie, CO 80516	18,000,000		
Erie Community Library	Essential/ Shelter	400 Powers St., Erie, CO 80516	2,637,045		
Leon A. Wurl Service Center	Vital	150 Bonnell Ave., Erie, CO 80516	5,000,000		
Erie Municipal Airport	Essential/ Air Transportation	395 Airport Dr., Erie, CO 80516	1,552,369		
Electrical Substation	Essential/ Utility	905 County Line Rd., Erie, CO 80516	n/a		
Erie High School	Essential/ Shelter, At-Risk Population	3180 WCR 5 Erie, CO 80516	17,806,467		
Erie Middle School	Essential/ Shelter, At-Risk Population	650 Main St., Erie, CO 80516	n/a		
Black Rock Elementary	Essential/ Shelter, At-Risk Population	2000 Mtn. View Pkwy, Erie, CO 80516	8,099,688		
Red Hawk Elementary	Essential/ Shelter, At-Risk Population	1500 Telleen Dr., Erie, CO 80516	n/a		
Erie Elementary	Essential/ Shelter, At-Risk Population	4137 E. County Line Rd, Erie, CO 80516	3,504,700		

Name of Asset	Type ¹	Address	Replacement Value (\$) ²	Occupancy/ Capacity #	Hazard Specific Info
Aspen Ridge Preparatory School	Essential/ Shelter, At-Risk Population	705 Austin Avenue, Erie, CO 80516	3,232,814		
Vista Ridge Academy	Essential/ Shelter, At-Risk Population	3100 Ridge View Dr., Erie, CO 80516	4,022,478		
Blue Mtn. Montessori School	Essential/ Shelter, At-Risk Population	201 S. Briggs St., Erie, CO 80516	176,150		
Primrose	Essential/ Shelter, At-Risk Population	2998 Ridge View Dr., Erie, CO 80516	990,664		
The Goddard School	Essential/ Shelter, At-Risk Population	3000 Village Vista Dr., Erie, CO 80516	747,638		
Wee School Preschool	Essential/ Shelter, At-Risk Population	690 Briggs St., Erie, CO 80516	163,478		
Erie Reservoir	Essential/ Utility	3155 US 287, Erie, CO 80516	n/a		
Prince Reservoir #2	Essential/ Utility	3050 N. 111 th St., Erie, CO 80516	n/a		
Thomas Reservoir	Essential/ Utility	2000 N. 119 th St., Erie, CO 80516	n/a		
1.5 MGD and 4 MGD Water Storage Tanks	Essential/ Utility	1375.35 WCR 7, Erie, CO 80516	n/a		
Colorado National Golf Course Clubhouse	Essential/ Shelter	2700 Vista Pkwy, Erie, CO 80516	2,498,800		
Century Link Communications	Essential	360 Wells St., Erie, CO 80516	n/a		
Avista Family Medicine – Urgent Care	Essential	611 Mitchell Way, Ste. 103, Erie, CO 80516	n/a		
Oil & Gas Wells	Hazardous Materials	Throughout Region ³	n/a		
Tri County Self Storage	Hazardous Materials	1401 E. County Line Rd., Erie, CO 80516	2,933,300		Unknown chemical storage potential
County Line Lumber	Hazardous Materials	4047 NE County Line Rd, Erie, CO 80516	651,000		Misc. building products & materials

Name of Asset	Type ¹	Address	Replacement Value (\$) ²	Occupancy/ Capacity #	Hazard Specific Info
Napa Auto Parts	Hazardous Materials	1020 Carbon Ct., Erie, CO 80516	n/a		Solvents
Magnum Plastics	Hazardous Materials	425 & 475 Bonnell Ave., Erie, CO 80516	1,568,244		Solvents
John Murphy Millworks	Hazardous Materials	1065 Telleen Ave., Erie, CO 80516	682,300		Solvents
Phillip's Seeding	Hazardous Materials	2405 CR 1, Erie, CO 80516	85,772		Chemicals
Azar Woodcraft	Hazardous Materials	455 Young Ct., Erie, CO 80516	n/a		Solvents
Safeway	Retail/Hazardous Materials	3333 Arapahoe Rd., Erie, CO 80516	3,193,400		Propane Storage
7-11	Hazardous Materials	3240 Village Vista Dr.	1,057,832		Propane Storage, Gas
Conoco	Hazardous Materials	4200 County Line Rd., Erie, CO 80516	177,600		Propane Storage, Gas
Shell Service Station	Hazardous Materials	3334 Arapahoe Rd., Erie, CO 80516	920,200		Propane Storage, Gas
Stop & Save	Hazardous Materials	681 Mitchell Way, Erie, CO 80516	866,798		Propane Storage, Gas
County Line Auto Body	Hazardous Materials	1021 Carbon Ct., Erie, CO 80516	866,798		Welding Material, Paint
Blue Sky Club House	Community	1455 Sunset Way, Erie, CO 80516	n/a		Pool Chemicals
Arapahoe Ridge Pool	Community	1750 Powell St., Erie, CO 80516	n/a		Pool Chemicals
Erie Commons Pool	Community	751 Eichhorn Dr., Erie, CO 80516	n/a		Pool Chemicals
Vista Ridge HOA Pool	Community	SEC Skyline Dr/ Mountain View Blvd., Erie, CO 80516	n/a		Pool Chemicals
Erie Senior Housing Complex	At-Risk Population	800 High St., Erie, CO 80516	603,214		

Critical facility counts and types are shown in Table B.5.

Table B.5. Summary of Erie's Critical Facilities in GIS

Critical Facility Type	Facility Count
Airport	1
Bridges – please add	5
Communications	1
Community Center	3
Dams	4
Day Cares	5
Elderly Facility	1
Fire Stations	1
Police	1
Power Substation	1
Public Works	1
Schools	7
Water Treatment Plant	1
Water Reclamation	2
Water Storage Tank	2
Total	36

Source: Town of Erie, Colorado

Figure B.1. Erie's Base Map and Critical Facilities

Please visit www.erieco.gov/maps and select Critical Facilities Map

B.3.3 Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from a 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.

According to a survey conducted in February, 2014 the following are Erie's major employers:

- St. Vrain Valley School District
- Town of Erie
- Safeway Stores, Inc.
- U.S. Postal Service
- Magnum Plastics
- Waste Connections
- Air Mechanical Inc.
- Vector Air
- Primrose

- Colorado National Golf Course
- The Goddard School

B.3.4 Natural, Historic, and Cultural Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Erie has 758 acres of dedicated parks and open space. The Parks Division is responsible for maintaining community and regional parks, improved arterial rights-of-way, ball fields, trails, Town-owned open space, and storm water detention facilities. Maintenance includes, but is not limited to, maintenance of park equipment, mowing, weed control, irrigation, planting, fertilization, pruning, and trash pickup. The Town currently maintains:

- 149 acres of developed parks
- 609 acres of open space
- 62 miles of roadsides
- 34 miles of trail corridor
- 59 acres of landscaping at Town facilities

During September and October 2007, a team of scientists explored selected natural areas on undeveloped lands throughout Erie's Planning Area to create a Natural Areas Inventory. The inventory was assembled into a reference document that describes and rates natural areas, their value to humans and wildlife, and how to protect them. Erie contains a range of valuable natural resources that contribute to its visual quality and character, provide valuable wildlife habitat, and provide connections to other open space corridors in the region. Areas of primary significance include the Coal and Boulder Creek corridors.

Erie's planning area is crisscrossed by many waterways, including Boulder Creek and Coal Creek, and a number of irrigation canals and ditches built to serve agricultural lands surrounding the community. Protection of these features and of the surrounding floodplain is a key issue for the community.

For information about natural resources in Boulder County, which includes Erie, see the Vulnerability Assessment.

Historic and Cultural Resources

The Town of Erie Historic Preservation Advisory Board meets to discuss issues related to the preservation of historic structures, documents and artifacts in Erie. The board reports to the Board of Trustees in an advisory capacity. Commissioners are appointed by the Board of Trustees in staggered four-year terms.

The Erie Historical Society (EHS) was founded in 1984 to preserve Erie, Colorado's history. EHS honors those hard working pioneers who mined the coal, worked the fields and ran the railroads, as well as the pioneer women who raised the families and educated the children.

The purpose of this society shall be to bring together those people interested in history especially the history of Erie, and area to bring about an appreciation of the heritage of the American West. It will collect and preserve artifacts of the period and shall provide educational programs illustrating life in the early 20th century. It shall preserve and disseminate printed historical material regarding the community.

Understanding the history of the community is basic to our democratic way of life, gives us a better understanding of our state and nation and promotes a better appreciation of our American Heritage.

The Erie Historical Society educates through projects like the Wise Homestead Museum, to commemorate early homesteaders and through partnerships with community members. Historic talks by local historians and lecturers provide a glimpse back in time and reveal remarkable stories about the people who settled in our region of Colorado.

The EHS preserves the area's rich history through projects like the Wise Homestead Museum, at 11611 Jasper Road. The two-story Western Victorian farmhouse was built by Erie settler O.E. Wise in 1870 and has been restored by local and state Historical Societies. As such, the Wise Homestead Museum is considered a historic/cultural resource located in Erie.

B.4 Growth and Development Trends

Table B.6 illustrates how Erie has grown in terms of population and number of housing units between 2000 and 2013.

Table B.6.

2000 Population	2015 Population Estimate	Estimated Percent Change (%) 2000-2010	2000 # of Housing Units	2015 Estimated # of Housing Units	Estimated Percent Change (%) 2000-2014
6,985	22,000	+315	2,328	7,323	+315

Source: Town of Erie, Colorado

Over the past two decades, Erie has experienced a significant amount of growth compared to historic rates. From 1990 to 2000, Erie experienced a 400 percent increase in population. From 2000 to 2013, Erie experienced a 300 percent increase in population.

Household and population projections between 2000 and 2025 are shown in Table B.7.

Table B.7. Erie's Household and Population Projections, 2000-2025

Year	# of Dwellings	Change	Total Population	Change
2000	2,328	--	6,985	--
2005	5,016	+2,688	15,048	+8,063
2010	6,630	+1,614	19,890	+4,842
2015	7,323	+693	22,000	+2,110
2025	14,580	+7,257	40,680	+18,680
2000-2025	--	+12,252	--	+33,695

Source: Town of Erie Comprehensive Plan, www.erieco.gov/

The dominant land use in incorporated Erie is single family residential with the predominant commercial areas located along major arterials (I-25, Highway 7, Highway 287, Highway 52 and the County Line Road and Erie Parkway intersection). There is one active landfill and one temporarily closed landfill in the incorporated area, comprising approximately 668 acres.

Figure B.2. Erie's Future Land Use Map

Please visit www.erieco.gov/maps to view the Town of Erie Zoning Map and Comprehensive Development Plan Map.

B.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes Erie's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

B.5.1 Mitigation Capabilities Summary

Table B.8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Erie.

Table B.8. Erie's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Town of Erie Comprehensive Plan, 2005
Zoning ordinance	Yes	Erie Municipal Code
Subdivision ordinance	Yes	Erie Municipal Code, Standards and Specifications
Growth management ordinance (policy)	Yes	Town of Erie Comprehensive Plan, 2005
Floodplain ordinance	Yes	Erie Municipal Code
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Wildfire: Public Burning Ban - Ordinance
Building code	Yes	2006 International Codes
BCEGS Rating	No	
Fire department ISO rating	Yes	Rating: 3/9
Erosion or sediment control program	Yes	Erie Municipal Code
Stormwater management program	Yes	Erie Municipal Code
Site plan review requirements	Yes	Erie Municipal Code
Capital improvements plan	Yes	Budget
Economic development plan	Yes	Town of Erie Economic Development Plan
Local emergency operations plan	Yes	Town of Erie Local Emergency Operations Plan
Other special plans	Yes	Water Conservation Master Plan
Flood insurance study or other engineering study for streams	Yes	Outfall Systems Plans, Flood Insurance Study, Letters of Map Revision
Elevation certificates	Yes	
Other	Yes	Natural Areas Inventory, Vulnerability Assessment, Coal Creek Flood Control Project

Table B.9 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Erie.

Table B.9. Erie's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of	Yes	Department of Public Works	

land development/land management practices		Civil Engineers/Director
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Chief Building Official Department of Public Works Civil Engineers/Director
Planner/engineer/scientist with an understanding of natural hazards	Yes	Department of Public Works Civil Engineers
Personnel skilled in GIS	Yes	Department of Public Works GIS Technician
Full-time building official	Yes	Chief Building Official Building Inspectors
Floodplain manager	Yes	Department of Public Works Civil Engineer
Emergency manager	Yes	Chief of Police
Grant writer	Yes	Assistant to the Town Administrator
Other personnel	Yes	Chief of Police Police Lieutenant
GIS Data – Hazard areas	Yes	
GIS Data – Critical facilities	Yes	
GIS Data – Building footprints	Yes	
GIS Data – Land use	Yes	
GIS Data – Links to assessor's data	Yes	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Everbridge, Reverse 911, Cable Override, Website, Email List serve, Facebook, Twitter

Table B.10 identifies financial tools or resources that Erie could potentially use to help fund mitigation activities.

Table B.10. Erie's Fiscal Mitigation Capabilities

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

B.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The Town of Erie joined the National Flood Insurance Program (NFIP) on October 17, 1979. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds.

NFIP insurance data indicates that as of August 1, 2013, there were 32 policies in force in Erie (Boulder and Weld counties), resulting in \$7,635,900 of insurance in force. In Erie, there have been two claims for flood losses filed totaling approximately \$1,000.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Erie activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

2005 Comprehensive Plan

The Town of Erie Comprehensive Plan is an advisory document that outlines the community's vision and goals for the future and provides guidance for Town officials in making choices regarding the long-range needs of the community. The plan's goals and guiding principles, policies, and recommendations, along with the Future Land Use map (see Figure B.2 above), provide guidance for decisions affecting growth and annexation, the use and development of land, preservation of open space, and the expansion of public facilities and services. The following goals and policies directly mitigate hazards addressed in this plan:

Goal: Protect Sensitive Areas—Preserve environmentally sensitive areas from development

- Discourage Development in Sensitive or Hazard Areas: The Town will discourage developments where a significant risk to life and property exist, as in areas of floodplain, geologic hazard, unstable soils, undermined areas, and steep slopes in accordance with the recommendations of the Colorado Geologic Survey, FEMA, and the Office of Mined Lands.

Goal: Environmentally Sensitive Design Promote environmentally sensitive design that minimizes the use of and impacts to renewable and non-renewable resources

- Develop Water Conservation Principles: The Town will encourage conservation of water resources in the landscape through the use of xeriscaping principles (i.e., where landscapes are designed with drought-tolerant plants in low water zones as well as fully irrigated zones) and the use of non-potable water for landscape irrigation.
- Undermined Areas: Development should not be permitted over undermined areas unless risks can be mitigated. Portions of the site deemed to be undevelopable due to the effects of undermining should be integrated as part of an overall open space network.

Goal: Establish an Open Space Program—Conserve and maintain important open space lands in and around Erie

- Characteristics of Open Space: Open space is characterized as undeveloped land that is permanently committed to be maintained in a natural or agricultural state and that serves one or more functions identified in the plan, including protecting the public from natural and geologic hazards.

A number of other goals and policies in the comprehensive plan indirectly mitigate hazards addressed in this plan. The Natural Resource and Environment and Open Space chapters, in particular, further mitigate hazards by protecting valuable natural resources (e.g., wetlands, riparian areas).

Erie Municipal Code

Drainage and Flood Control

In regard to hazard mitigation, Erie's strongest and most directly related regulations are those related to drainage and flood control. These regulations were designed to promote the public health, safety, and general welfare; to minimize flood losses in areas subject to flood hazards; and to promote wise use of the floodplain. More specifically, they were established to:

To reduce the hazard of floods to life and property through:

- Prohibiting certain uses which are dangerous to life or property in time of flood;
- Restricting uses which would be hazardous to the public health in time of flood;
- Restricting uses which are particularly susceptible to flood damage, so as to alleviate hardship and eliminate demands for public expenditures for relief and protection;
- Requiring permitted floodplain uses, including public facilities which serve such uses, to be protected against flood by providing flood proofing and general flood protection at the time of initial construction;
- Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities; and

- Requiring that uses vulnerable to floods, including facilities which serve such uses be protected against flood damage at the time of initial construction.

To protect floodplain occupants from a flood which is or may be caused by their own or other land use and which is or may be undertaken without full realization of the danger, through:

- Regulating the manner in which structures designed for human occupancy may be constructed so as to prevent danger to human life within such structures;
- Regulating the method of construction of water supply and sanitation systems so as to prevent disease, contamination and unsanitary conditions;
- Delineating and describing areas that could be inundated by floods so as to protect individuals from purchasing floodplain lands for purposes which are not in fact suitable;
- Minimizing the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimizing prolonged business interruptions;
- Ensuring that potential buyers are notified that property is in an area of special flood hazard; and
- Ensuring that those who occupy the areas of special flood hazards assume responsibility for their actions.

To protect the public from the burden of avoidable financial expenditures for flood control and relief by:

- Regulating all uses within the floodplain areas so as to produce a method of construction and a pattern of development which will minimize the probability of damage to property and loss of life or injury to the inhabitants of the flood hazard areas;
- Minimizing damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard; and
- Helping maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas.

To protect the storage capacity of floodplains and to assure retention of sufficient floodway area to convey flood flows which can reasonably be expected to occur by:

- Regulating filling, dumping, dredging, and alteration of channels by deepening, widening, or relocating;
- Prohibiting unnecessary and damage creating encroachments;
- Encouraging uses such as agriculture, recreation and parking; and
- Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities.

To protect the hydraulic characteristics of the small watercourses, including the gulches, sloughs and artificial water channels used for conveying floodwaters, which make up a portion of the urban drainage system, by:

- Regulating filling, dumping, and channelization so as to maintain the natural storage capacity and slow flow characteristics;
- Prohibiting encroachment into the small watercourses to maintain the natural storage capacity and slow flow characteristics;
- Encouraging uses such as greenbelt, open space, recreation, and pedestrian and riding trails;
- Controlling the alteration of natural floodplains, stream channels and natural protective barriers, which help accommodate or channel floodwaters;
- Controlling filling, grading, dredging, and other development which may increase flood damage; and
- Preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas.

Specifically, the regulations create two overlay zoning districts, the Floodway and Floodway Fringe districts, to identify properties within special flood hazard areas, require a development permit for construction of development in either district, identify permitted uses and conditions for permitted uses in the districts, sets standards and requirements for development in the districts, and outlines the duties and responsibilities of the floodplain administrator.

Other Regulations

Water and Wastewater—These regulations prohibit waste of water and establish the Town of Erie Water Conservation Program. The requirements for water conservation are voluntary unless made mandatory through a town board resolution. Additionally, the Town administrator may establish water usage hours and restrictions for the safety and welfare of the Town.

Zoning Regulations—This title is in accordance with the comprehensive plan and is designed to promote the health, safety, and general welfare; to prevent the overcrowding of land; to avoid undue concentration of population; and to facilitate the adequate provision of services (including water and drainage), among other things. No building or structure may be erected, constructed, reconstructed, altered, repaired, moved, or used unless in conformance with these regulations, and no land may be used unless in conformance with these regulations.

Subdivision Regulations—The purpose of this title is to assist orderly, efficient, and integrated development and to promote the health, safety, morals, convenience, order, prosperity, and general welfare of the present and future residents of the Town. General design standards call for preservation of natural features and attention to hazardous conditions. Land subject to hazardous conditions, such as landslides, mudflows, rockfalls, snowdrifts, possible mine subsidence, shallow water table, floods, etc., cannot be subdivided until the hazards have been mitigated or will be mitigated by the subdivision and construction plans. The design standards chapter also addresses surface water drainage and abandoned mines.

Other

The Erie Outfall System Plan evaluates the impact of existing and projected future development on flood peaks and presents a preliminary design of the plan, including stormwater outfall systems that safely convey the projected 100-year flood under future development conditions. The purpose of the outfall system planning study was to identify alternate methods to convey stormwater to enhance public health and safety and minimize property damage.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No projects currently identified.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

Erie has a Natural Areas Inventory Report that delineates and inventories the natural features and unique characteristics of undeveloped lands for their uniqueness as natural areas. Erie's natural areas are those places with natural resources such as wildlife habitat and corridors, native prairie and plant diversity, aquatic habitats and wetlands, significant topographic features, and scenic views that potentially offer opportunities to preserve, enhance, and recognize Erie's natural heritage. This report serves to highlight those locations and features that are worthy of sensitivity during land use planning.

Erie has a Community Forestry Program, which attends to the care and management of public tree resources in the Town's urban/community environment. Among the program's recognized benefit of trees are the following mitigation-related benefits: reduce soil erosion, provide shade for cooling, living snow fence, and living wind break.

Erie's Open Space and Trails Advisory Board advises the Board of Trustees on open space and trails related issues.

Erie's Water Conservation Master Plan (2008) provides guidance for effective water conservation while controlling costs related to implementation. The plan evaluates Erie's water demands and supplies, defines goals specific to the conservation program, and evaluates and selects conservation measures/programs for implementation. It focuses on conservation measures and programs that are compatible with Erie's water supply system, water resources management strategy, and community values.

Water Conservation Program: The Town has intentionally developed a diverse water portfolio in order to provide enough flexibility to meet customer demands under most conditions. Erie continually monitors and adjusts water rights, leases, and deliveries to meet the anticipated demands. Moreover, the town continually monitors and adjusts operations and procedures to manage the demands. When certain "trigger" conditions are reached, the town will react in

kind to implement planned, water reduction actions (water conservation action levels). The Town of Erie maintains as its baseline, a voluntary water conservation program. Erie residents are asked to voluntarily comply with Action Level 1 of the Town's Water Conservation Program, which calls for twice-weekly lawn watering. Under Action Level 1, residents with even-numbered addresses are asked to water on Sunday and Thursday. Residents with odd numbered addresses are asked to water on Wednesday and Saturday. Lawn watering is recommended between 7:00pm and 7:00am.

Residential Irrigation Audits: The Town of Erie has partnered with the Center for ReSource Conservation, to provide an irrigation audit program for commercial and residential irrigation systems. This program meets one of the requirements of the Water Conservation Plan. An irrigation audit is designed to pinpoint inefficiencies in an irrigation system, which contributes to water waste, unnecessary runoff, and increased run-time and maintenance costs.

The Town of Erie contracts with mosquito control contractors to provide the Town's mosquito surveillance and control activities during the summer months.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

The Town of Erie Senior staff, first responders, and various administrative and Department of Public Works staff are National Incident Management System (NIMS) certified.

Mountain View Fire Rescue, based out of Longmont, currently has one fire station located in Erie and provides for Erie's fire protection and emergency medical services. Two other fire stations are currently scheduled for construction in 2015.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

- Erie received Hazard Mitigation Grant Program funding for roadway improvements/traffic safety at the intersection of 119th and Erie Parkway.
- Regional Detention Pond Facility
- Erie receives drainage system maintenance assistance from the Urban Drainage and Flood Control District for the following drainage facilities:
 - Arapahoe Ridge Filing 1 Detention pond
 - Arapahoe Ridge Filing 2 Detention Pond
 - Orchard Glen Filing 1 Detention Pond
 - Orchard Glen Filing 2 Detention Pond
 - Drainage Channel in orchard Glen Filing 2 between Marfell St. and Madison Ct.
 - Canyon Creek Filing 1 Detention Pond

- Canyon Creek Filing 3 Detention Pond
 - Canyon Creek Filing 6 Detention Pond
 - Drainage Channel through Canyon creek from Erie Parkway to Meller Street
 - Creekside Detention Pond south of the railroad tracks
 - Creekside Detention Pond west of County Line Road
 - Creekside Drainage Channel along the northwest side of Creekside
 - Drainage Channel along the south side of the Railroad Tracks west of County Line Road
 - Kenosha Farms Detention Pond
 - Drainage Channel between Erie Village and Kenosha Farms from the point of intersection of the two channels north to the pond.
- UDFCD provided up to 50% matching funds working with the Town of Erie for the following drainage improvement projects:
 - Arapahoe Ridge Filing 1 Detention Pond
 - Arapahoe Ridge Filing 2 Detention Pond
 - 111th Street Drainage Design
 - Old Town By-Pass Drainage Improvements
 - Creekside Regional Detention Pond south of the railroad tracks

Erie received a Pre-Disaster Mitigation grant from FEMA for replacement of a culvert at a Coal Creek crossing.

Erie received a DOLA grant and a loan from CWCB for improving Coal Creek including the construction of a levee to protect Old Town from the 100-year flood, this was in the mid 90's. The U.S. Army Corps of Engineers has inspected Erie's levee and determined that it qualifies for Public Law 84-99 Rehabilitation assistance for Non-Federal flood Control Projects. This inspection has also insured that Erie's Levee continues to be certified by FEMA for flood Protection purposes.

After the 2013 floods Town of Erie Department of Public Works staff worked with FEMA, the State of Colorado, and other Federal agencies and managed the process of submitting and seeking reimbursement for nearly 40 projects totaling more than \$1.3 million.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

The Town of Erie maintains an "Emergency Preparedness" website which provides community-specific information and links to emergency preparedness information from a variety of local, state, and federal sources on its website.

Erie makes available the Boulder Office of Emergency Management Emergency Preparedness Guide and the READYColorado “Pack a Kit Checklist” on the Town’s website.

The Town utilizes its website (www.erieco.gov), social media (Facebook and Twitter) and Erie Government Television (Comcast Channel 8) to promote general Public Health and Safety Information. These media outlets are considered by the Town to be valuable tools for providing the residents of Erie with information about matters pertaining to public health and safety. In fact, 95% of respondents to a statistically valid Citizen Survey conducted in 2013 site the Town of Erie’s website as their preferred source for obtaining information about the Town. Additionally, 82% of respondents cited Erie Edition newsletter as a preferred source for obtaining information about the Town. Media releases, Newsflashes, educational programming and public notices pertaining to family emergency preparedness are some examples of information disseminated by the Town.

During and after the 2013 flood and severe weather incidents in Erie, the Town utilized its social media and website to keep the public informed and provided essential public health and safety instructions.

The Town promotes Water-Wise Landscaping Best Practices for citizens to use in making choices about their home landscaping to best use limited water resources.

In November 2014, the Erie Police Department graduated 26 Erie Residents from a two-day CERT (Community Emergency Response Team) Training program. These residents learned about disaster preparedness for a variety of hazards that may impact our community. Through classroom training and hands on exercises, CERT members were taught what it takes to assist others in their neighborhood or workplace following an event when professional responders are not immediately available to assist.

Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
Town of Erie						
Implement Emergency email and txt messaging notification system in ERIE	Town of Erie - Administration	Y			High	NA
Continue to implement sound floodplain	Town of Erie - DPW	Y	Y		High	High

management practices as communities participating in the NFIP						
Install additional Outdoor Warning Sirens at new MVFR stations to be built starting 2015.	- Town of Erie - MVFR	N	N	1/2015		High
Emergency Generator for Town Hall	Town of Erie - DPW	N	N	1/2015		High
Coal Creek Trail Improvements	Town of Erie - DPW	N	N	1/2015		Medium
Boulder Creek Trail Improvements	Town of Erie - DPW	N	N	1/2015		Medium
Portable Radio Kit	Town of Erie P.D.	N	N	1/2015		High

Name of action: Outdoor Warning Sirens

Hazards Addressed: Injury / Loss of Life Due to Severe Weather

Mitigation Goal or Objective Addressed: Early warning system. Minimize loss of life, public safety.

Issue/Background: The Town of Erie and Mountain View Fire Rescue (MVFR) have partnered to provide an outdoor warning notification siren for MVFR's Station 6, located at Erie Parkway and Bonanza Drive in the Grandview neighborhood of Erie. The siren matches others currently in operation throughout Boulder County and augments the siren located on 111th Street in Lafayette, which services southwestern Erie. Coordination and testing of the county-wide network of outdoor sirens is managed by the Boulder Office of Emergency Management (BOEM). MVFR will be constructing two new fire stations within Erie in the near future. Expansion of Erie's outdoor warning system within our growing community is essential to efforts to minimize loss of life during severe weather events.

Other Alternatives: NA

New or Deferred Action: New Action

Responsible Office: Town of Erie Administration – Fred Diehl, 303-926-2764

Priority (High, Medium, Low): High

Cost Estimate: \$25,000 X 2 = \$50,000

Existing or Potential Funding: Pre-Hazard Mitigation Grants

Benefits (avoided losses): Minimize loss of life, public safety.

Schedule: Within next 2 years

Name of action: Emergency Generator

Hazards Addressed: Power Outages Due to Severe Weather

Mitigation Goal or Objective Addressed: Continuity of Operations

Issue/Background: Erie Town Hall and the Erie Police Department are located at 645 Holbrook Street in Historic Downtown Erie. The building is a renovated, turn of the century school house. Though updated in 1998-1999, the building lacks a sufficient emergency generator to supply electrical power to all offices including Town Administration and the Erie Police Department.

Other Alternatives: NA

New or Deferred Action: Deferred Action

Responsible Office: Town of Erie Administration – Fred Diehl, 303-926-2764

Priority (High, Medium, Low): High

Cost Estimate: \$75,000

Existing or Potential Funding: Pre-Hazard Mitigation Grants

Benefits (avoided losses): Continuity of operations. Minimize loss of life, public safety.

Potential or current subject matter expertise:

Schedule: Within next 2 years

Name of action: Coal Creek Improvements

Hazards Addressed: Injury / Loss of Life Due to Flooding

Mitigation Goal or Objective Addressed: Proper channel flow / flood prevention. Minimize loss of life, public safety and improve water quality.

Issue/Background: The Town of Erie Department of Public Works has started design of improvements to two sections of Coal Creek; one from Vista Ridge Parkway south to the Concrete Box Culvert, and the

other section near the irrigation reservoir east of Erie Commons. Once design work is completed, priority areas will be defined so the project can be phased and funding allocated. The Town would seek various funding sources for construction of improvements along both sections of Coal Creek.

Other Alternatives: NA

New or Deferred Action: New Action

Responsible Office: Town of Erie Department of Public Works – Gary Behlen, 303-926-2871.

Priority (High, Medium, Low): Medium

Cost Estimate: \$2,500,000

Existing or Potential Funding: Pre-Hazard Mitigation Grants, 319 funding

Benefits (avoided losses): Minimize loss of life, public safety and improve water quality.

Schedule: Within next 2 years

Name of action: Boulder Creek Improvements

Hazards Addressed: Injury / Loss of Life Due to Flooding

Mitigation Goal or Objective Addressed: Proper channel flow / flood prevention. Minimize loss of life, public safety and improve water quality.

Issue/Background: The Town of Erie Department of Public Works has started design of protection of the banks eroded during the September 2013 flood and add a diversion structure on Boulder Creek by the North Water Reclamation Facility. Once design work is completed, the Town would seek various funding sources for construction of improvements along this portion of Boulder Creek.

Other Alternatives: NA

New or Deferred Action: New Action

Responsible Office: Town of Erie Department of Public Works – Gary Behlen, 303-926-2871.

Priority (High, Medium, Low): Medium

Cost Estimate: \$250,000

Existing or Potential Funding: Pre-Hazard Mitigation Grants, 319 funding

Benefits (avoided losses): Minimize loss of life, public safety.

Schedule: Within next 2 years

Name of action: Portable Radio Kit

Hazards Addressed: Public Safety Communications

Mitigation Goal or Objective Addressed: Continuity of Operations and Public Safety

Issue/Background: During a recent severe weather incident the Erie Police Department established an Incident Command Post (ICP) at the Erie Public Works facility. The incident commander was operating on a hand-held radio and it was difficult to transmit and receive radio transmissions from inside the building.

The Erie Police Department has asked a vendor, Advance Wireless Communications (AWS) to provide a quote to build a portable communications kit. A kit similar to the photograph below would allow the Erie Police Department to establish an ICP at various locations and operate with an outside antenna and either 110 Volt AC or 12 Volt DC power source.



Other Alternatives:

New or Deferred Action: New Action

Responsible Office: Town of Erie – Chief Marc Vasquez, 303 926 2811

Priority (High, Medium, Low): High

Cost Estimate: \$15,000

Existing or Potential Funding: *Pre-Hazard Mitigation Grants*

Benefits (avoided losses): Continuity of operations. Minimize loss of life, public safety.

Potential or current subject matter expertise:

Schedule: Within next 2 years

Annex C: Jamestown

C.1 Community Profile

Jamestown is a mountain community located in central Boulder County at an elevation of 7,000 feet at the confluence of James Creek and Little James Creek. The City of Boulder is 14 miles to the southeast. Gold was discovered in the 1870's and the Town became an important area for stamping (processing) of gold ore; as many as eight stamping mills were in use by the 1880s. Concurrently, the Town became a source of supplies and social activities for the miners and was incorporated as a statutory Town by the Colorado Legislature on April 4, 1883. As the gold played out, the mining of fluorspar became more important and several fluorspar mines existed around the Town into the 1960s. With transportation improvements and a paved road, residents found they could live in Jamestown and be employed in Boulder or Longmont; today most residents commute to work but there is also a mix of retirees and cottage industry.

C.1.1 Population

The estimated 2010 population of the Town of Jamestown was 274. Select Census 2010 demographic and social characteristics for Jamestown are shown in Table C.1.

Table C.1. Jamestown's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	51.5
Female (%)	48.5
Under 18 Years (%)	6.6
65 Years and Over (%)	12.0
Race/Ethnicity (one race)	
White (%)	99
Hispanic or Latino (Of Any Race) (%)	1.0
Other	
Average Household Size	2.1
High School Graduate or Higher (%)	100

Source: U.S. Census Bureau, 2010, www.census.gov/

C.1.2 Economy

According to the 2000 Census, the industries that employed most of Jamestown's labor force were educational, health, and social services (47.7%); professional, scientific, management, administrative, and waste management services (14.6%); and manufacturing (13.9%). Select economic characteristics for Jamestown from 2013 estimates are shown in Table C.2.

Table C.2. Jamestown's Economic Characteristics

Characteristic	
Families below Poverty Level, 2013	0
Individuals below Poverty Level, 2013	~20
Median Home Value	\$289,800
Median Household Income, 2013 (est.)	\$65,227
Per Capita Income, 2013 (est.)	\$27,000
Population in Labor Force	174

Source: U.S. Census Bureau, 2009-2013 American Community Survey 5-year estimates, www.census.gov/

C.2 Hazard Summary

The most significant hazards for Jamestown are floods, debris flow, drought, wildfire and windstorm. Refer to Section 4.3 Vulnerability Assessment for detailed vulnerability to the flood and wildfire hazards. Other hazards that could impact Jamestown include hailstorm, lightning, and severe winter storm. Due to its location in the foothills Jamestown has had problems with nearby wildfires, floods and debris flows associated with heavy rains on the burned areas.

C.3 Asset Inventory

C.3.1 Property Inventory

Table C.3 represents an inventory of property in Jamestown based on the Boulder County Assessor's data as of March 12, 2008.

Table C.3. Jamestown's Property Inventory Before September 2013 Floods

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	140	15,433,800	135	21,510,500	36,944,300
Exempt	22	2,268,300	1	273,100	2,541,400
Commercial	1	77,400	1	80,900	158,300
Vacant	51	1,115,200	0	0	1,115,200
Minerals	6	32,300	0	0	32,300
Unknown	2	0	0	0	0
Total	222	18,927,000	137	21,864,500	40,791,500

Source: Boulder County Assessor's Office

Table C.4. represents an inventory of property in Jamestown based on the Boulder County Assessor's data as of December 31, 2014

Table C.4. Jamestown's Property Inventory After September 2013 Floods

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	139	3,914,865	117	16,094,300	20,009,165

Exempt	23	2,338,535	2	409,900	2,748,435
Commercial	3	221,614	3	699,814	921,428
Vacant	44	677,400	0	0	677,400
Minerals	5	25,900	5	0	25,900
Unknown	0	0	0	0	0
Total	214	7,178,314	127	17,204,014	24,382,328

C.3.2 Other Assets

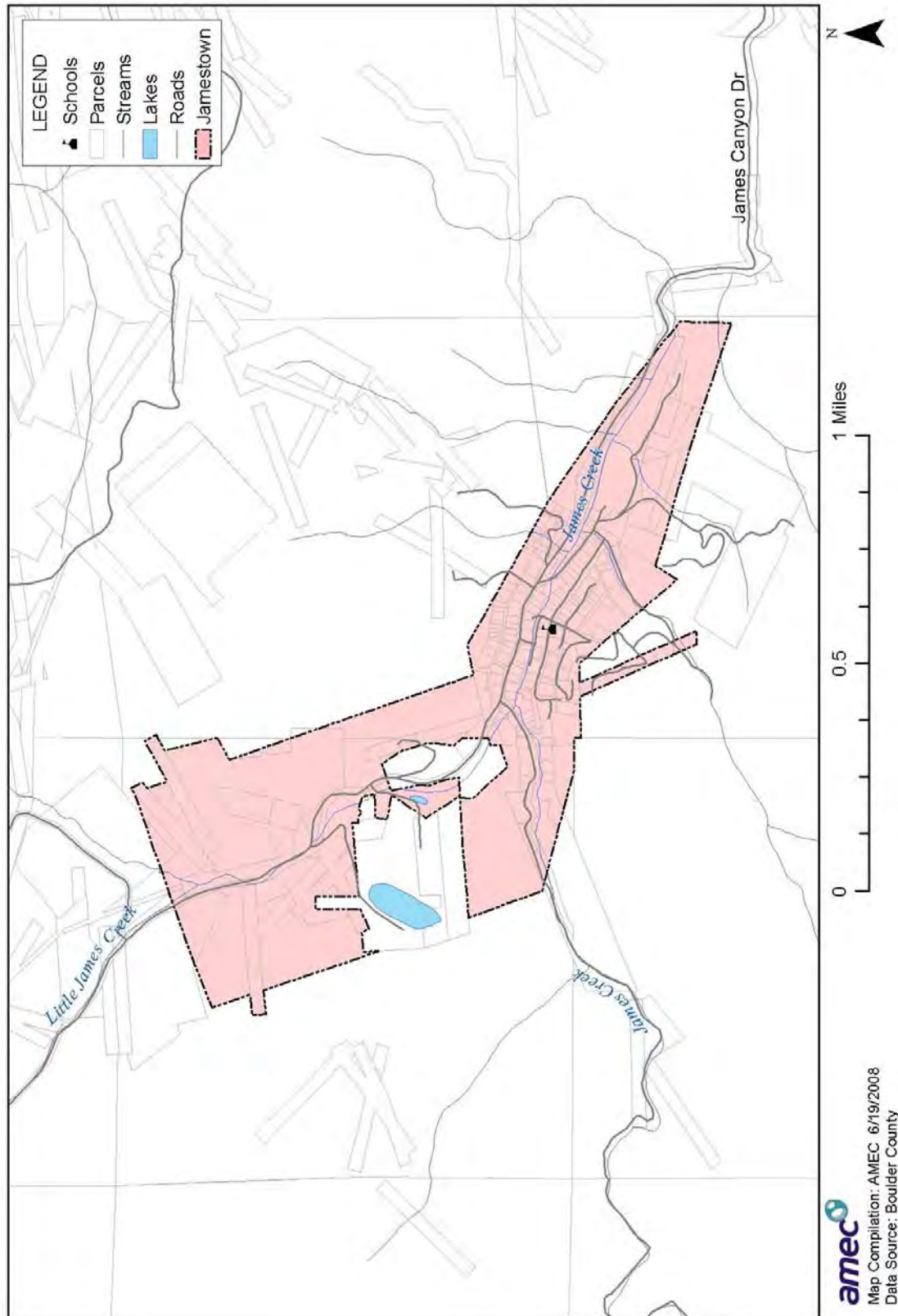
Table C.4 is a detailed inventory of assets identified by the Town’s planning team. This inventory includes critical facilities. For more information about how “critical facility” is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table C.5. Jamestown’s Assets

Name of Asset	Type	Address	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Fire Hall	Critical/Essential		\$888,000		Fire collapse
Town Hall	Critical/High Potential Loss		\$400,000		Fire collapse, historic structure
Upper Bridge	Critical/Transportation		\$2,200,000		Flood collapse
Lower Main Bridge	Critical/Transportation		\$1,100,000		Flood collapse
Water Treatment Plant	Critical		\$1,500,000		Fire, flood collapse

The GIS database provided by Boulder County includes one school in Jamestown (kindergarten through 5th grade). The location of this school is shown on the map in Figure C.1.

Figure C.1. Jamestown's Base Map and Critical Facilities



C.3.3 Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major employers are unable to return to normal operations, impacts ripple throughout the community.

According to the 2007 Jamestown Community Profile from the Denver Regional Council of Governments, the major employers in Jamestown are the U.S. Postal Service and the Boulder Valley School District.

C.3.4 Natural, Cultural, and Historic Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

For information about natural resources in Boulder County, which includes Jamestown, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

Table C.6 lists the properties in Jamestown that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties (for more information about these registers, see Section 4.3 Vulnerability Assessment).

Table C.6. Jamestown's Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Jamestown Mercantile Building	108 Main Street	8/3/1989
Jamestown Town Hall	118 Main Street	7/10/2003

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/; National Register Information System, www.nr.nps.gov/

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

C.4 Growth and Development Trends

Table C.7 illustrates Jamestown's growth in terms of population and number of housing units between 2000 and 2010.

Table C.7. Jamestown's Change in Population and Housing Units, 2000-2010

2000 Population	2010 Population	Estimated Percent Change 2000-2010	2000 # of Housing Units	2010 Estimated # of Housing Units	Estimated Percent Change 2000-2010
205	274	+25	102	135*	+25

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/

* down to 117 post- September 2013 flood

No significant development trends are expected; however, some limited to moderate growth at wildland interface area west of town is anticipated.

C.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capability assessment summarizes Jamestown's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

C.5.1 Mitigation Capabilities Summary

Table C.8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Jamestown.

Table C.8. Jamestown's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	We have a Hazardous Mitigation Plan, a Stream Corridor Master Plan, and a Comprehensive Plan (1981)
Zoning ordinance	No	

Subdivision ordinance	Yes	Ord 2, Series 2009 – An ordinance adopting revised subdivision regulations and providing for the enforcement thereof
Growth management ordinance	Yes	Ord 2, Series 1984 – An ordinance for the regulation and restriction of the use of real property to limit development in the Town of Jamestown to provide services and to preserve the small town character of the Town
Site plan review requirements	No	
Floodplain ordinance	Yes	Ord 8, Series 2012 – An ordinance providing for the prevention of flood damage through adoption of principles promulgated by the Federal Emergency Management Agency
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	
Building code	Yes	Version: Ordinance 4, 2005, updating to 2006 by 10/081997 IGA with Boulder County Land Use concerning the implementation of building and electrical permit and inspection services for the Town of Jamestown
Fire department ISO rating	Yes	Rating: 5
Erosion or sediment control program	No	
Stormwater management program	No	
Capital improvements plan	Yes	Reserve Property Taxes
Economic development plan	No	
Local emergency operations plan	No	
Other special plans	Yes	Flood Hazard Mitigation Plan, 1993
Flood insurance study or other engineering study for streams	Yes	Stream Corridor Master Plan with provisional hydrology/hydraulics and mapping dated February 2014, u Environmental Sustainability Study (for catastrophic wildfire event that would contaminate the creek)

Table C.9 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Jamestown.

Table C.9. Jamestown's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	No		Would be contracted
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Temporary Contractor	Would be contracted
Planner/engineer/scientist with an understanding of natural hazards	Yes	Temporary Contractor	Would be contracted
Personnel skilled in GIS	Yes		Volunteer
Full-time building official	No	Boulder County	Intergovernmental agreement
Floodplain manager	Yes		Grant supported to July 2016
Emergency manager	Yes	Fire Chief	Volunteer
Grant writer	Yes	Volunteers/Donations Coordinator	Volunteer
GIS Data – Hazard areas	Yes	Boulder County Data	
GIS Data – Critical facilities	Yes	Boulder County Data	
GIS Data – Building footprints	Yes	Boulder County Data	
GIS Data – Land use	Yes	Boulder County Data	

Personnel Resources	Yes/No	Department/Position	Comments
GIS Data – Links to assessor's data	Yes	Boulder County Data	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Boulder County	

Table C.10 identifies financial tools or resources that Jamestown could potentially use to help fund mitigation activities.

Table C.10. Jamestown's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	
Capital improvements project funding	Yes	Capital Improvements Fund portion of property tax revenue
Authority to levy taxes for specific purposes	Yes	Subject to TABOR
Fees for water, sewer, gas, or electric services	Yes	Water (municipal)
Impact fees for new development	Yes	Ord 1, Series 2012 – The Imposition, computation, and payment of land development fees to offset the impact of new growth in the town and providing for the establishment of separate impact fee funds, and providing for exemptions, refunds and appeals
Incur debt through general obligation bonds	No	
Incur debt through special tax bonds	No	Subject to TABOR
Incur debt through private activities	No	
Withhold spending in hazard-prone areas	No	(per 2014 revision supplied by Erika – which will it be? I vote to withhold spending in high hazard areas)

C.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The Town of Jamestown joined the National Flood Insurance Program (NFIP) on July 18, 1983. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds.

NFIP insurance data indicates that as of October 31, 2014, there were 20 policies in force in Jamestown, resulting in \$5,067,200 of insurance in force. Of these, 19 were for single family homes, of which 7 are in the AE zone (special flood hazard areas), and 13 are in the standard or preferred lower risk zones. There is \$14,859 worth of premiums in force, which is the total amount of premiums paid annually by the 20 policy holders in Jamestown. (As of January 5, 2015) In Jamestown prior to the 2013 flood, there had been two historical claims for flood losses totaling \$696. These losses were both for pre-FIRM single-family homes in a B, C, or X zone. There were no repetitive or severe repetitive losses.

Following the 2013 flood there are \$1,779,171 in paid losses. (As of January 5, 2015)

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Jamestown activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

Comprehensive Plan 1981- Describes use of property within the Town limits and identifies areas of potential growth.

Land acquisition in the SFHA through HMGP.

Subdivision Ordinance- Limits new building lots to a minimum of 2.3 acres and provides for public input prior to completion of any division of land.

Growth Ordinance – Provides for minimum lot size for growth on building parcels recognized prior to the Town Subdivision Ordinance.

Floodplain Management Ordinance- Contains element of FEMA model and is approved by Colorado Water Conservation Board.

Flood Hazard Mitigation Plan – Describes emergency resources and mitigation options in case of flood

Other

A drainage plan has been devised for the area behind the Town Hall, church, and parsonage in relation to the Town Hall addition.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

There are currently no private property protection activities being undertaken. The Town has contracted for a flood study and topographical surveys for Skunk Tunnel Road.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions and are usually implemented by parks, recreation, or conservation agencies or organizations.

The Town has completed the restoration of the soil cap on 5 acres of Elysian Park (19.5 acres) and some additional natural resource protection is built into the project (monitoring plan, etc).

Emergency Services

Emergency services measures are taken during an emergency to minimize impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

No current projects/activities.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

The Town of Jamestown has replaced a culvert (post office location) with prefab concrete to control mudflow. Jamestown received a Flood Mitigation Assistance Grant from the Colorado Water Conservation Board in 2000 to implement a project that was later destroyed in the 2004 mudslides. A 2013 mudslide at the same location resulted in one death. Subsequent NRCS project funding created a retaining wall structure, but the culvert underneath CR 94 is still the original capacity.

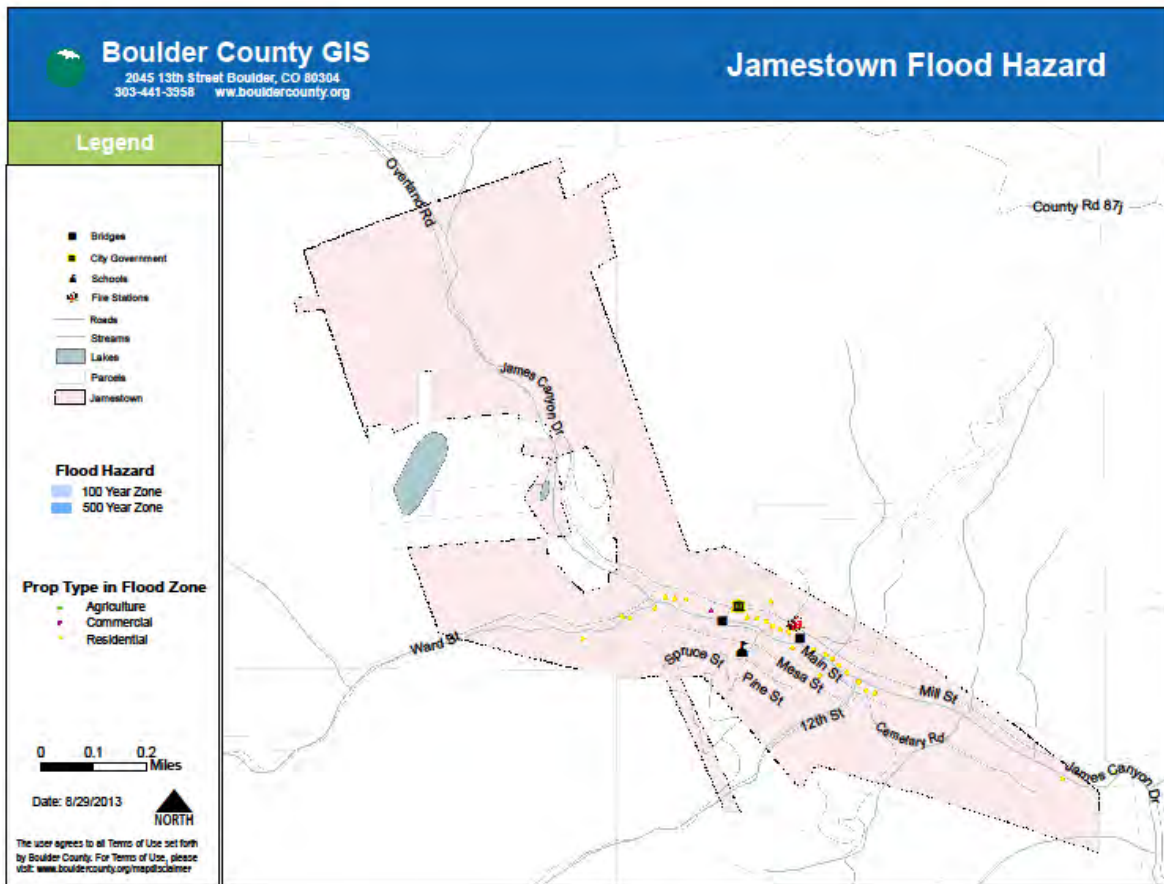
A 2013 NRCS grant for emergency watershed protection was used to improve the channel on James Creek throughout Town, and resulted in post-flood riparian and floodplain reconfiguration with bioengineered structures to reduce velocity and scouring from 25 year flood events.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards. They detail the ways to protect people and property from the hazards, and describe the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

The Town has hosted educational programs including those provided by the EPA, U.S. Forest Service, Boulder County Health, James Creek Watershed Initiative, and Left Hand Watershed Oversight Group.

Figure C 5.2.2 Jamestown Flood Hazard



Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
Town of Jamestown						
Continue to implement sound floodplain management practices as a community participating in the NFIP and CRS	Jamestown's Mayor's Office	Y / N	Y / N		High	
Perform channel improvements and replace culvert on Little James creek	Town of Jamestown/NRCS/EPA	Yes	Completed	October 2014	High	
Install drainage	Town of Jamestown	No	No		Low	Low

improvements to skunk tunnel road						
Rain Gauge	Town of Jamestown	No	Yes	2015		High
Dwelling Elevations	Town of Jamestown/HMGP	No	Yes		Low	High
Andersen Hill Bridge	Town of Jamestown	No	Yes	2015		
Lower Main St. Bridge	Town of Jamestown	No	No		Low	Low
Property Acquisitions	Town of Jamestown	No	Yes	2015 2015	Low	High
Gillespie Gulch Culvert	Town of Jamestown	No	Yes	2015	Low	High

Annex D: Lafayette

D.1 Community Profile

The City of Lafayette encompasses 9.48 square miles and is located on the eastern edge of Boulder County, just northwest of Denver. Lafayette's altitude is 5,236 feet above sea level.

In 1888, Mary Miller, a prominent farmer on whose land the discovery of coal in 1884 began coal mining in the area, platted 150 acres for the Town of Lafayette (named for her late husband). By July of 1888, the first houses were built and a second mine, the Cannon, was in operation. Within six months, there were two general stores, a livery stable, and several boarding houses.

In January 1900, Lafayette suffered a devastating fire that destroyed much of the town's original business district. By 1914, Lafayette had recovered sufficiently to support two banks, four hotels, three restaurants, a "picture show," a bakery, a candy store, a local newspaper, two poolrooms, and a pickle factory. Lafayette also had a brick works and a power station that provided electricity to Boulder, Louisville, Longmont, and Fort Collins.

As natural gas slowly replaced the use of coal for fuel, the mines began cutting production and finally closed. In 1956, the Black Diamond Mine was the last Lafayette mine to close. Many Lafayette miners continued to work at the Eagle Mine in Erie until it shut down in 1979. With the decline of mining, agriculture again became the dominant economic activity in the Lafayette area. Rapid growth in Denver and Boulder brought Lafayette substantial residential growth and as the town grew, the farming-base economy shifted again to commercial enterprises and small industrial and manufacturing concerns.

D.1.1 Population

The estimated 2013 population of the City of Lafayette was 26,629. Select Census 2010 demographic and social characteristics for Lafayette are shown in Table D.1.

Table D.1. Lafayette's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	48.9
Female (%)	51.1
Under 5 Years (%)	7.0
65 Years and Over (%)	8.1
Race/Ethnicity (one race)	
White (%)	85.6
Hispanic or Latino (Of Any Race) (%)	18.2
Other	
Average Household Size	2.35
High School Graduate or Higher (%)	93.3

Source: U.S. Census Bureau, American Fact Finder 2010,
http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml

D.1.2 Economy

According to the 2000 Census, the industries that employed most of Lafayette's labor force were educational, health, and social services (19.5%); professional, scientific, management, administrative, and waste management services (15.1%); manufacturing (14%); retail trade (11.1%). Select economic characteristics for Lafayette from the 2000 Census are shown in Table D.2.

Table D.2. Lafayette's Economic Characteristics

Characteristic	
Families below Poverty Level, 2009	6,424
Individuals below Poverty Level, 2009	2,182
Median Home Value	\$258,900
Median Household Income, 2009	\$69,759
Per Capita Income, 2009	\$32,149
Population in Labor Force	19,349

Source: U.S. Census Bureau (2000), www.census.gov/

D.2 Hazard Summary

The most significant hazards for Lafayette are floods, expansive soils, land subsidence, and severe winter storm. Refer to Section 4.3 Vulnerability Assessment for detailed vulnerability to the flood hazard. Due to the historical coal mining in the area subsidence of the land surface is a concern in Lafayette. Hazard maps associated with land subsidence can be referenced in the City's Comprehensive Plan (<http://www.cityoflafayette.com/Files/Hazards%20Map.pdf>). The City has mapped areas of very low-low, moderate, and high subsidence hazard, based on the probability of a subsidence event occurring. Other hazards that could impact Lafayette include dam failure, drought, hailstorm, earthquake, extreme heat, lightning, tornado, windstorm, West Nile Virus and Pandemic Flu.

D.3 Asset Inventory

D.3.1 Property Inventory

Table D.3 represents an inventory of property in Lafayette based on the Boulder County Assessor's data as of March 12, 2008.

Table D.3. Lafayette's Property Inventory

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	8,479	758,633,200	8,209	1,817,117,600	2,575,750,800
Commercial	238	75,348,300	207	200,027,300	275,375,600
Exempt	266	76,433,200	95	181,531,200	257,964,400
Industrial	67	22,616,700	64	54,555,500	77,172,200
Agricultural	21	93,700	4	1,272,700	1,366,400
Vacant	526	55,643,600	0	0	55,643,600
Oil & Gas	18	2,056,500	0	0	2,056,500
Minerals	38	16,300	0	0	16,300
State Assessed	10	0	0	0	0
Unknown	14	0	0	0	0
Total	9,677	990,841,500	8,579	2,254,504,300	3,245,345,800

Source: Boulder County Assessor's Office

D.3.2 Other Assets

Table D.4 is a detailed inventory of assets identified by the City's planning team. This inventory includes critical facilities. For more information about how "critical facility" is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table D.4. Lafayette's Assets

Name of Asset	Type	Address	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Exempla Hospital	Economic		\$300 M	1,000	
Wal-Mart	Economic		\$20 M	300	
Water Treatment Facility	Lifeline		\$15 M	13 MGD	
Potable Water Storage Tanks	Lifeline		\$9M		
Wastewater Facility	Lifeline		\$10 M	4.4 MGD	
Lift Station	Lifeline		\$ 0.5 M		
Communication Tower	Essential		\$1.5 M	150' Tall Sheriff Communications	

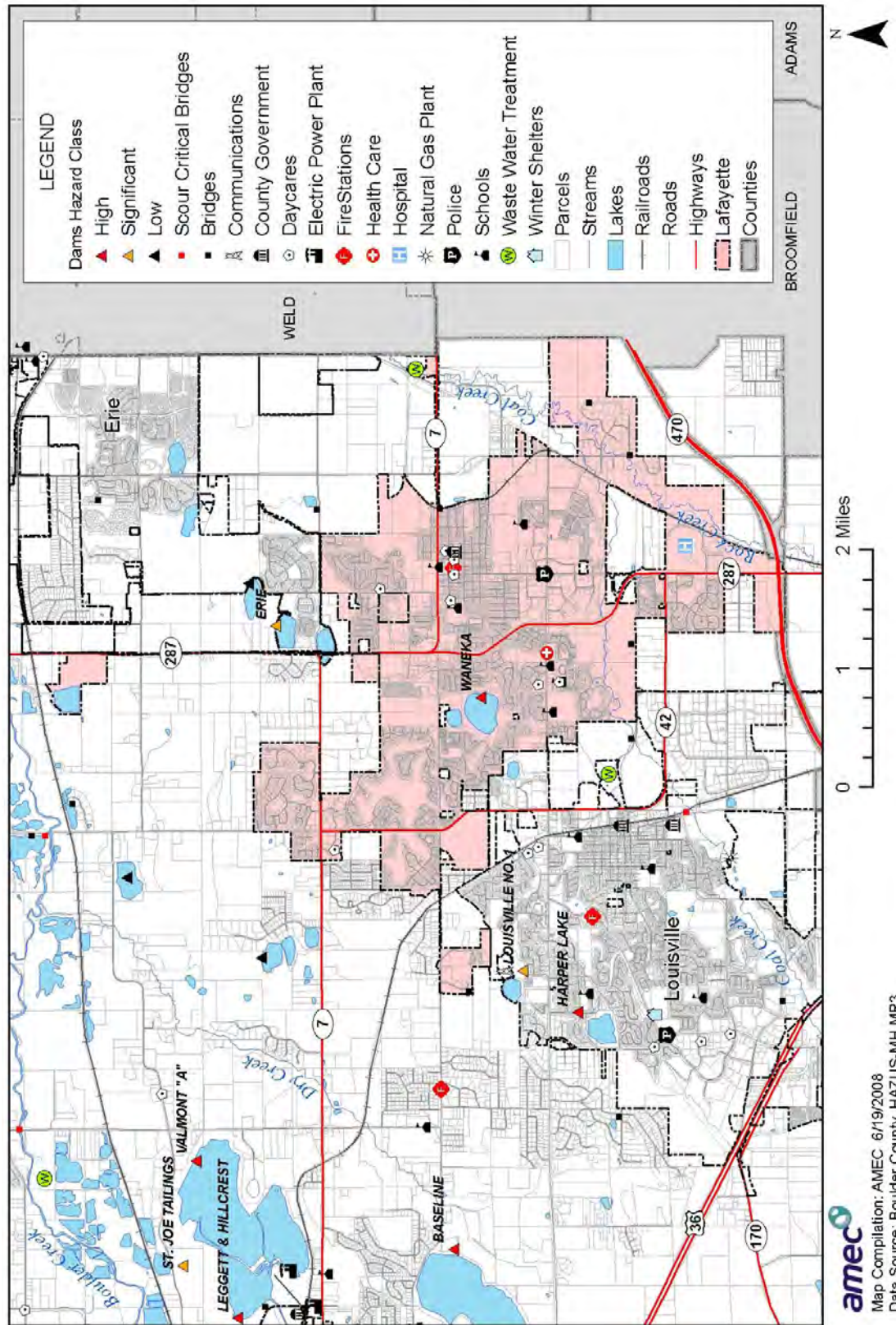
Some of the facilities listed above are also in GIS databases provided by Boulder County. Critical facility counts and types are shown in Table D.5 and in the map in Figure D.1. Shelters may be in facilities such as schools or recreation centers and are not indicated on the map.

Table D.5. Summary of Lafayette's Critical Facilities in GIS

Critical Facility Type	Facility Count
Bridges	7
County Government Buildings	1
Dams	1
Day Care Facilities	9
Fire Stations	2
Health Care	1
Hospital	1
Police	1
Schools	6
Shelters	2
Waste Water Treatment	1
Total	31

Source: Boulder County

Figure D.1. Lafayette's Base Map and Critical Facilities



D.3.3 Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major employers are unable to return to normal operations, impacts ripple throughout the community.

According to the City of Lafayette Community Profile 2007, the City's major employers are Exempla/Kaiser Medical Complex, Wal-Mart, Boulder Valley School District, Universal Forest Products (housing products), Northrup Grumman (information technology service), and Rocky Mountain Instruments Laser (optic manufacturer).

D.3.4 Natural, Cultural, and Historic Resources

Natural Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

For information about natural resources in Boulder County, which includes Lafayette, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

Table D.6 lists the properties in Lafayette that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties (for more information about these registers, see Section 4.3 Vulnerability Assessment). Those properties that are only on the Colorado State Register are indicated with an asterisk.

Table D.6. Lafayette's Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Congregational Church	300 E. Simpson Street	5/20/1983
*Ewing Farm	1915 N. 95 th Street	12/13/1995

Property	Address	Date Listed
Kulgren House	209 E. Cleveland Street	5/20/1983
Lafayette House	600 E. Simpson Street	5/20/1983
Lewis House	108 E. Simpson Street	5/20/1983
Miller House	409 E. Cleveland Street	5/20/1983
The Terrace	205- 207 E. Cleveland Street	11/3/1987

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/; National Register Information System, www.nr.nps.gov/

*Only on the Colorado State Register of Historic Properties

The Lafayette Register of Historic Places was established by City ordinance in 1998. The purpose of the register is to protect local structures, sites, or neighborhoods that represent distinctive examples of architecture, are associated with famous historic events or persons, or make a special contribution to the distinctive character of Lafayette. Table D.7 lists the properties on Lafayette's Register of Historic Places not already mentioned in Table D.6 above.

Table D.7. Additional Historic Properties in Lafayette

Property	Address	Date Listed
Angevine House	610 E. Simpson House	8/15/2000
Beckett House	307 East Cleveland Street	04/07/09
Catholic Rectory	109 West Cannon Street	09/18/12
Evans House	201 East Chester Street	09/18/12
Henderson House	209 W. Simpson Street	11/28/2007
Lafayette Cemetery	111 West Baseline Road	12/09/08
Lafayette High School	101 East Baseline Road	12/09/08
Lafayette Methodist Church	211 E. Geneseo	6/29/2000
James Albert & Rosie House	310 West Simpson Street	11/18/08
Knill/Green House	200 East Cannon Street	02/17/09
Maxwell House	406 E. Baseline Road	6/17/2004
Padfield House	104 E. Simpson Street	9/18/2007
Richards House	201 East Cleveland Street	05/18/10
Swennes House	410 W. Cleveland Street	6/19/2007
Thomas House	513 Elm Street	6/27/2000
Waneka Granary	East side of Waneka Lake	7/17/2001
Weiler House	401 E. Baseline Road	6/27/2000

Source: Lafayette Register of Historic Places, www.cityoflafayette.com/Page.asp?NavID=1831

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

D.4 Growth and Development Trends

Table D.8 illustrates how Lafayette has grown in terms of population and number of housing units between 2010 and 2013.

Table D.8. Lafayette's Change in Population and Housing Units, 2010-2013

2010 Population	2013 Population Estimate	Estimated Percent Change 2010-2013	2010 # of Housing Units	2013 Estimated # of Housing Units	Estimated Percent Change 2010-2013
24,453	26, 629	+8.89	9,997	10,885	+8.89

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/

Like many communities within the rapidly growing U.S. Highway 36 Corridor, the City of Lafayette witnessed significant growth in population over the last decade. Growth projections shown in Table D.9 take into account the City's Growth Management Requirement, which limits housing construction to approximately 200 units per year.

Table D.9. Lafayette's Population Projections 2010-2020

	2010	2013	2020
Population	24,453	26,629	30,215
Percent Change (%)	--	+8.89	+13.46

D.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes Lafayette's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

D.5.1 Mitigation Capabilities Summary

Table D.10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Lafayette.

Table D.10. Lafayette's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	2013 Technical Update to Lafayette Comprehensive Plan, 2003
Zoning ordinance	Yes	Municipal Code Chapter 26
Subdivision ordinance	Yes	Municipal Chapter 26

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Growth management ordinance	Yes	Municipal Chapter 30
Floodplain ordinance	Yes	Municipal Chapter 26
Site plan review requirements	Yes	Municipal Code Chapter 26
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Open Space, Disaster Emergency Services, Stormwater, Fire Prevention
Building code	Yes	2006 International Codes
BCEGS Rating	No	
Fire department ISO rating	Yes	Rating: 4
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Capital improvements plan	Yes	
Economic development plan	Yes	
Local emergency operations plan	Yes	
Other special plans	Yes	Parks, Recreation, Open Space and Trails Master Plan 2013; Fire Department Master Plan, 2012; 2008 Water Conservation Plan, 2008
Flood insurance study or other engineering study for streams	Yes	Urban Drainage and Flood Control District and FEMA
Elevation certificates	Yes	Where required

Table D.11 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Lafayette.

Table D.11. Lafayette's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Planning Department and Public Works Department	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Planning and Building Department and Public Works Department (City Engineer)	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Public Works Department and Planning Department (City Engineer)	
Personnel skilled in GIS	Yes	Planning and Building Department	
Full-time building official	Yes	Planning and Building Department	
Floodplain manager	Yes	Planning and Building Department	
Emergency manager	Yes	Fire Chief, Police Chief	
Grant writer	Yes	Various Departments	
Other personnel	Yes		
GIS Data – Hazard areas	Yes	Planning Department	
GIS Data – Critical facilities	No		Could be easily identified
GIS Data – Building footprints	No		
GIS Data – Land use	Yes	Planning Department	
GIS Data – Links to assessor's data	Yes	Online	
Warning systems/services	Yes	Fire, Police	

Personnel Resources	Yes/No	Department/Position	Comments
(Reverse 9-11, cable override, outdoor warning signals)			

Table D.12 identifies financial tools or resources that Lafayette could potentially use to help fund mitigation activities.

Table D.12. Lafayette’s Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	No	
Capital improvements project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric services	Yes	
Impact fees for new development	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	
Incur debt through private activities		
Withhold spending in hazard-prone areas		

D.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The City of Lafayette joined the National Flood Insurance Program (NFIP) on March 18, 1980. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds.

NFIP insurance data indicates that as of February 29, 2008, there were 19 policies in force in Lafayette, resulting in \$5,957,400 of insurance in force. Of these, 12 were for residential properties (all but 1 were single-family homes), and 7 were in A zones (special flood hazard areas). In Lafayette, there have not been any historical claims for flood losses, thus there were no repetitive or severe repetitive losses.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Lafayette activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator’s Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

2013 Technical Update to the Lafayette Comprehensive Plan, 2003

The Comprehensive Plan was adopted in 2003. The 2003 Lafayette Comprehensive Plan is a series of documents setting forth goals and policies for the future of Lafayette. It was prepared with the general purpose of guiding and coordinating a harmonious development of the City and its environs that, in accordance with present and future needs, best promotes health, safety, order, convenience, prosperity, and general welfare. The purpose of the plan is to state the preferences and priorities of the Lafayette community and to serve as a guide for current and future public decisions, especially the distribution and intensity of development, the location of future land uses (including public facilities and open spaces), and requested zoning changes. A technical update to the 2003 Comprehensive Plan was adopted April 1, 2014. Information was also collected from the most recent Community Survey (2012), Census (2010), Denver Regional Council of Government (DRCOG), the Downtown Vision Plan (2010), the CDOT 2013 Planning Environmental Linkage (PEL) Study, and the Parks, Recreation, Open Space, & Trails (PROST) Master Plan (2013). The objective of this update is to bring the 2003 Comprehensive Plan current with existing and projected conditions.

Goals and some of the associated policies that are most related to hazard mitigation include the following:

Goal: Protect the health, safety, and welfare of the citizens through adequately mitigating environmental hazards and by eliminating, reducing, or preventing air, water, light, and noise pollution.

- Restrict development in the 100-year floodplain. No structure should be located, constructed, extended, converted, or altered without full compliance with Lafayette’s floodplain standards.
- Require applicants for new development and redevelopment to submit analyses of the 100-year floodplain as performed by professional engineers in areas where the floodplain has since been filled, graded, or otherwise altered since the October 4, 2002, flood insurance rate map.
- Apply pre-construction design considerations to all proposed construction as outlined in the State of Colorado, Boulder County Subsidence Investigation (dated March 1986) study area regardless of the hazard zones involved.
- On undeveloped land, abatement techniques for mine shafts and slopes may be required of developers and no undeveloped land overlying high-risk subsidence zones will be built on (exceptions apply).

Goal: Conserve environmental resources to insure the most efficient use of such resources.

- Conserve water through public education, supply management, and demand management techniques.
- Encourage water conservation landscape construction and maintenance practices as part of the development review process and through public educational efforts.

Goal: Preserve and conserve unique or distinctive natural and manmade features in recognition of their irreplaceable character and importance to the quality of life in the City of Lafayette.

- Require, at the City’s discretion, that proposed development applications include an evaluation of potential impacts on possible wildlife habitat and corridors and wetland areas. Construction of buffer zones may be required to protect these areas.
- Protect wildlife habitats and wetlands.
- Ensure that proposed development and redevelopment appropriately responds to existing topography to avoid excessive site grading and/or retainage.
- Cooperate with Boulder County in establishing a wetlands management plan to avoid degradation of critical wetlands located within the planning area.

Goal: Provide the citizens of Lafayette professional fire protection by using a combination fire department (career and volunteer firefighters).

Goal: Provide a balanced system of open lands, natural areas, wildlife corridors and habitat areas, trails, and greenways using a variety of conservation methods to meet both the needs of Lafayette’s citizens and the City’s resource protection goals.

Among the documents that make up this plan is a hazards map that highlights floodplains, wells, and subsidence zones. Due to the size of the map, it is not reproducible here. It can be viewed online at <http://www.cityoflafayette.com/documentCenter/View/4430>

A land use map that also shows the City’s floodplain and the uses within it can be viewed at <http://www.cityoflafayette.com/documentcenter/view/4431>

Code of Ordinances

Chapter 26 Development and Zoning (Includes Floodplain Standards)

This chapter encourages the most appropriate use of land throughout the City and ensures a logical growth of the various physical elements of the City to secure safety from fire, flood, and other dangers; to conserve property values; to prevent overcrowding; to facilitate adequate provisions of services; and to preserve and promote the public health, safety, and welfare of the inhabitants of the city and the general public, among other things.

It includes a number of ordinances that indirectly mitigate hazards (e.g., zoning and subdivision ordinances). Among the regulations specific to hazard mitigation are the Development and Design Standards, which state that land subject to natural hazards such as flooding shall be considered unsuitable for residential occupancy or other uses which impair the health, safety, or welfare of the inhabitants, and the Floodplain Standards:

The purposes of these standards are to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

Protect human life and health;

Minimize expenditure of public money for costly flood control projects;

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

Minimize prolonged business interruptions;

Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard;

Help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas;

Ensure that potential buyers are notified that property is in an area of special flood hazard; and

Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, this Section includes methods and provisions for:

Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

Controlling the alteration of natural floodplains, stream channels, and natural protective barriers which help accommodate or channel floodwaters;

Controlling filling, grading, dredging, and other development which may increase flood damage; and

Preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas.

Specifically, the regulations require a development permit for construction of development in any area of special flood hazard, outline the duties and responsibilities of the planning director in administering this section, and set standards for flood hazard reduction, including anchoring, construction materials and methods, design and location of utilities, subdivision proposals, elevation (base flood elevation), floodproofing, and mobile homes. Additional provisions more stringently limit development in floodways.

Other Regulations

Chapter 35 Disaster Emergency Services—The purposes of this chapter are to provide for the preparation and carrying out of plans, including mock or practice drills for the civil defense of people and property in the event of a disaster and to provide for the coordination of the civil

defense and disaster functions with all other public agencies and affected private persons, corporations, and organizations.

Chapter 45 Fire Prevention and Protection—The purpose of the Fire Prevention Code is to provide the City with rules and regulations to improve public safety by promoting the control of fire hazards; regulating the installation, use, and maintenance of equipment; regulating the use of structures, premises, and open areas; providing for the abatement of fire hazards; establishing the responsibilities and procedures for code enforcement; and setting forth the standards for compliance and achievement of these objectives.

Chapter 80 Parks, Open Space, and Golf—Two ordinances in this chapter are related to hazard mitigation. The Open Space Ordinance establishes an open space advisory committee to examine the City's needs for additional open space and make recommendations to the Planning Commission and City Council and establishes open space use regulations. The Trees Ordinance promotes and protects the welfare of trees within the community by providing regulations for planting, maintaining, and removing certain trees. (Trees prevent soil erosion and provide shade and wind breaks).

Chapter 104 Stormwater—This chapter establishes a stormwater utility enterprise and an associated stormwater utility enterprise fund. Stormwater utility means all facilities used for collecting and conducting drainage and/or stormwater to, through, and from drainage areas to the points of final outlet including, but not limited to, any and all of the following: conduits and appurtenant features, canals, ditches, streams, gulches, gullies, flumes, culverts, bridges, streets, curbs, gutters, and pumping stations. The chapter imposes on each and every improved lot and parcel of land within the City a monthly usage fee for stormwater utility facilities.

Other

Lafayette's Major Basin Planning Phase B Report (1980) serves to guide the general concepts and approach for the City of Lafayette regarding the planning of drainage facilities required for new development.

The City's Public Works Department has a Stormwater Management Program. The current focus is on stormwater quality (quantity is regulated in the City's codes).

The City has a draft Water Conservation Plan (2008) that is currently out for public review. Lafayette contracts with Colorado Mosquito Control for mosquito-control services.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No current projects/activities.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

Lafayette owns over 1,000 acres of open space. Open space provides wildlife habitat, protects riparian areas and view corridors, provides buffers between other communities, and connects trail systems. It is acquired and maintained through two separate open-space taxes.

The Open Space Advisory Committee is appointed by City Council to make recommendations regarding the acquisition and management of open space properties.

The City of Lafayette 2001-2002 Open Space Management Policies (2000), which was created by the City of Lafayette Open Space Advisory Committee, identifies the City's official definition for open space and provides general guidelines for the use of the City's open space as well as maintenance and management guidelines for open space and open space riparian areas. An inventory of open space properties is provided detailing each property's attributes, characteristics, and associated issues; suggested uses and controls; and citizen suggestions for each property's use.

The City of Lafayette Parks, Recreation, Open Space and Trails Master Plan (2013) provides a tool to help the City implement its open space and trails vision with strategic recommendations that build off of the guiding principles outlined in the Comprehensive Plan.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

Lafayette's Fire Department Master Plan (2012) established goals and objectives for the department and set forth recommendations that allow the department to maintain existing services and improve services in a cost-effective manner.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

No current projects/activities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

The Open Space Advisory Committee organizes several activities each year to stimulate public appreciation of Lafayette's natural resources.

The City offers water conservation tips on its website.

The City has published a WaterWise Landscaping Best Practices Manual in conjunction with the Town of Erie for citizens to use in making choices about their home landscaping to best use limited water resources

Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
City of Lafayette						
Establish emergency shelter centers in the city of Lafayette	City of Lafayette,	Y / N	Y / N		Low	Low
Continue to implement sound floodplain management practices as communities participating in the NFIP	Lafayette planning and building Dept	Y / N	Y / N		High	High

Annex E: Longmont

E.1 Community Profile

Longmont encompasses 22 square miles and sits at an elevation of 4,979 feet above sea level. It is located 37 miles from Denver and 16 miles from Boulder.

In 1870, a group of prominent men in Chicago decided to start a new town in Colorado. They sold memberships in this new town, called “The Chicago-Colorado Colony” and used the money to buy 60,000 acres of land in a carefully chosen site in northern Colorado. They planned the town and brought people, lumber, and building materials to the barren site where they built a small town by the summer of 1871. They named the new town “Longmont” in honor of Longs Peak, clearly visible from the town.

While the climate of Longmont is dry, the soil is rich, and will produce excellent crops if water is brought to it. One of the great achievements of the Chicago-Colorado Colony was building large irrigation ditches to bring water from the rivers to the fields of wheat, fruit trees, and peas that farmers planted.

The Colony planners designed Longmont to look like many other towns in America. The original one-square-mile plan had stores along Main Street, homes arranged in a grid spreading out from Main Street, and industrial buildings located along the railroad and the St. Vrain River. As the town grew, large-scale agricultural industries arrived. The richness of Longmont’s soil attracted many people.

By 1910, the population of Longmont had doubled just about every ten years since its founding. Growth slowed after this and World War I and the pandemic of 1918 took their tolls on Longmont.

In 1925, the Ku Klux Klan gained control of Longmont’s City Council in an election. They began construction of Chimney Rock Dam, above Lyons. In the 1927 election, they were voted out of office, and their influence soon declined. Work on Chimney Rock Dam was abandoned as unfeasible, and its foundations are still visible in the St. Vrain River.

Longmont was affected by the Great Depression, the prolonged drought during the 1930s, and World War II. In 1950, the City’s economy was based primarily on agriculture, and Mayor Ralph Price, foreseeing a need for more water for a thirsty town, spearheaded the construction of Button Rock Dam, built seven miles upstream from Lyons on the North St. Vrain River. It paid for itself almost immediately, holding what could have been a disastrous flood in check, and filling the reservoir in a few days rather than the years it was projected to take.

In the 1960s, Longmont began to see a shift toward an economy based on advanced technologies. This trend became more pronounced in the 1970s with the closure of the Kurer-Empson vegetable cannery and the Great Western Sugar factory, which left few links to Longmont’s agricultural heritage.

E.1.1 Population

The estimated 2014 population of the City of Longmont is 91,911. The Census American Community Survey 5 – Year estimate of 2009 – 2013 demographic and social characteristics for Longmont are shown in Table E.1.

Table E.1. Longmont's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	50.6
Female (%)	49.4
Under 5 Years (%)	7.1
65 Years and Over (%)	11.1
Race/Ethnicity (one race)	
White (%)	67.5
Hispanic or Latino (Of Any Race) (%)	25.6
Other	
Average Household Size	2.59
High School Graduate or Higher (%)	87.1

Source: U.S. Census Bureau, 09-13 5-Year ACS

E.1.2 Economy

According to the 2009-2013 American Community Survey (ACS) 5-Year Estimate , the industries that employed most of Longmont's labor force were educational, health, and social services (18.6%); professional, scientific, management, administrative, and waste management services (17%); manufacturing (15.4%); and arts, entertainment, and recreation, and accommodation and food services (10.7%). Select economic characteristics for Longmont from the ACS Census estimate are shown in Table E.2.

Table E.2. Longmont's Economic Characteristics

Characteristic	
Families below Poverty Level (%)	11.1
Individuals below Poverty Level (%)	12.2
Median Home Value	\$238,900
Median Household Income	\$58,698
Per Capita Income	\$28,155
Population in Labor Force (%)	64.3
Unemployment (%)*	6.0

Source: U.S. Census Bureau, 09-13 5-Year ACS

E.2 Hazard Summary

Name of Asset	Type	Address	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Longmont United Hospital	Essential				
Longmont Clinic	Essential				
Salud Clinic	Essential				
Longmont Safety & Justice Center	Essential				
Fire Station 1	Essential				
Fire Station 2	Essential				
Fire Station 3	Essential				
Fire Station 4	Essential				
Fire Station 5	Essential				
LPC & PRPA Facilities (power plants)	High		22,629,000		
Amgen	High	4000 Nelson Road			Flammables, combustible liquids
Longmont Foods	High	150 Main Street			Ammonia
Mathson Tri-Gas	High	1861 Lefthand Circle			Flourine gas, tungsten hex, hexane, n-buthclithium
Circuits West	High	1820 Industrial Circle			Corrosives
Royal Crest Dairy	High	800 Weaver Park Road			Ammonia
McLane Western	High	2100 E Highway 119			Ammonia
Scott Specialty Gases	High	500 Weaver Park Road			Toxics, flammable gases
Array BioPharma	High	2620 Trade Centre			Toxics, corrosives, flammables
Woodleys Fine Furniture	High	320 S. Sunset Street			Flammables, spray booths
Wagner Welding Supply	High	10 Gay Street			Flammable gas, oxidizers
Avedon Engineering	High	811 S Lincoln Street			Flammable liquids
Northern Colorado	High				40,000 gallons propane

Energy					
Front Range Community College	High				
St Vrain Valley Schools	High				
Private Schools					
Our Center	High				
Day Care Centers	High				19 centers
Nursing Homes	High				
Alternative Homes for Youth	High	745 SH119			
Alterra Sterling House	High	2240 Pratt Street			
Applewood Living Center	High	1800 Stroh Place			
Aspen Meadows	High	70 21 st Avenue			
Beatrice Hover Assisted Living	High	1380 Charles Drive			
Boulder County Mental Health	High	119 11 th Avenue			
Bridge Street Assisted Living	High	2444 Pratt Street			
Bross Street Assisted Living	High	537 Bross Street			
Cinnamon Park I and II	High	1335 Cinnamon Street			
Community Advantage	High	2150 Emery Street			
Evergreen Group Home	High	1436 Hilltop Drive			
Group Home for Teenage Girls	High	1705 Collyer Street			
Hover Community, Inc.	High	1401 Elmhurst Drive			
Jacobs Center	High	420 11 th Avenue			
Life Care Center of Longmont	High	2451 Pratt Street			
Longmont Community Treatment Center	High	236 Main Street			
Longmont Regent	High	2210 Main Street			

Longs Peak Residence	High	2139 Emery Street			
Millbrook Homes	High	1745 Cove Court			
Millbrook Homes	High	5011 Fox Hill Drive			
Mountain View Plaza	High	1350 Collyer Street			
Peaks Care Center	High	1440 Coffman Street			
St. Vrain Manor	High	606 Pratt Street			
Village Place at Longmont	High	600 Coffman Street			
Main Government Buildings	High				28 buildings
Highways, bridges, & Tunnels	Transportation/ Lifeline	Hwy 287, Hwy 66, Hwy 119			
Railroads & Facilities	Transportation/ Lifeline	Burlington Northern railway runs through town			
Bus Facilities	Transportation/ Lifeline	Main station on South Main			
Vance Brand Airport	Transportation/ Lifeline				
Water Treatment Facilities	Transportation/ Lifeline	1 wastewater treatment plant			
Natural Gas Facilities and Pipelines	Transportation/ Lifeline				
Oil Facilities and Pipelines	Transportation/ Lifeline				
Communications Facilities	Transportation/ Lifeline				

The most significant hazards for Longmont are floods, dam failure, drought and severe winter storm. Refer to Section 4.3 Vulnerability Assessment for detailed vulnerability to the flood hazard. Note that the risk to a 500 year event is much greater than a 100 year event. Other hazards that could impact Longmont include hailstorm, earthquake, extreme heat, lightning, tornado, windstorm, West Nile Virus and Pandemic Flu. Due to its location on the plains in northeastern Boulder County the City has a slightly higher risk from tornados than other communities in this plan.

E.3 Asset Inventory

E.3.1 Property Inventory

Table E.3 represents an inventory of property in Longmont based on the Boulder County Assessor's data as of March 12, 2008.

Table E.3. Longmont's Property Inventory

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	26,854	1,909,755,000	26,501	5,331,359,200	7,241,114,200
Commercial	875	283,535,100	824	486,109,200	769,644,300
Industrial	195	103,064,600	194	338,688,400	441,753,000
Exempt	495	146,476,800	166	201,580,900	348,057,700
Agricultural	45	358,700	9	1,966,600	2,325,300
Vacant	1,341	133,921,200	-	0	133,921,200
Oil & Gas	1	79,100	-	0	79,100
Minerals	21	3,400	-	0	3,400
State Assessed	30	0	-	0	0
Unknown	38	0	-	0	0
Total	29,895	2,577,193,900	27,694	6,359,704,300	8,936,898,200

Source: Boulder County Assessor's Office

E.3.2 Other Assets

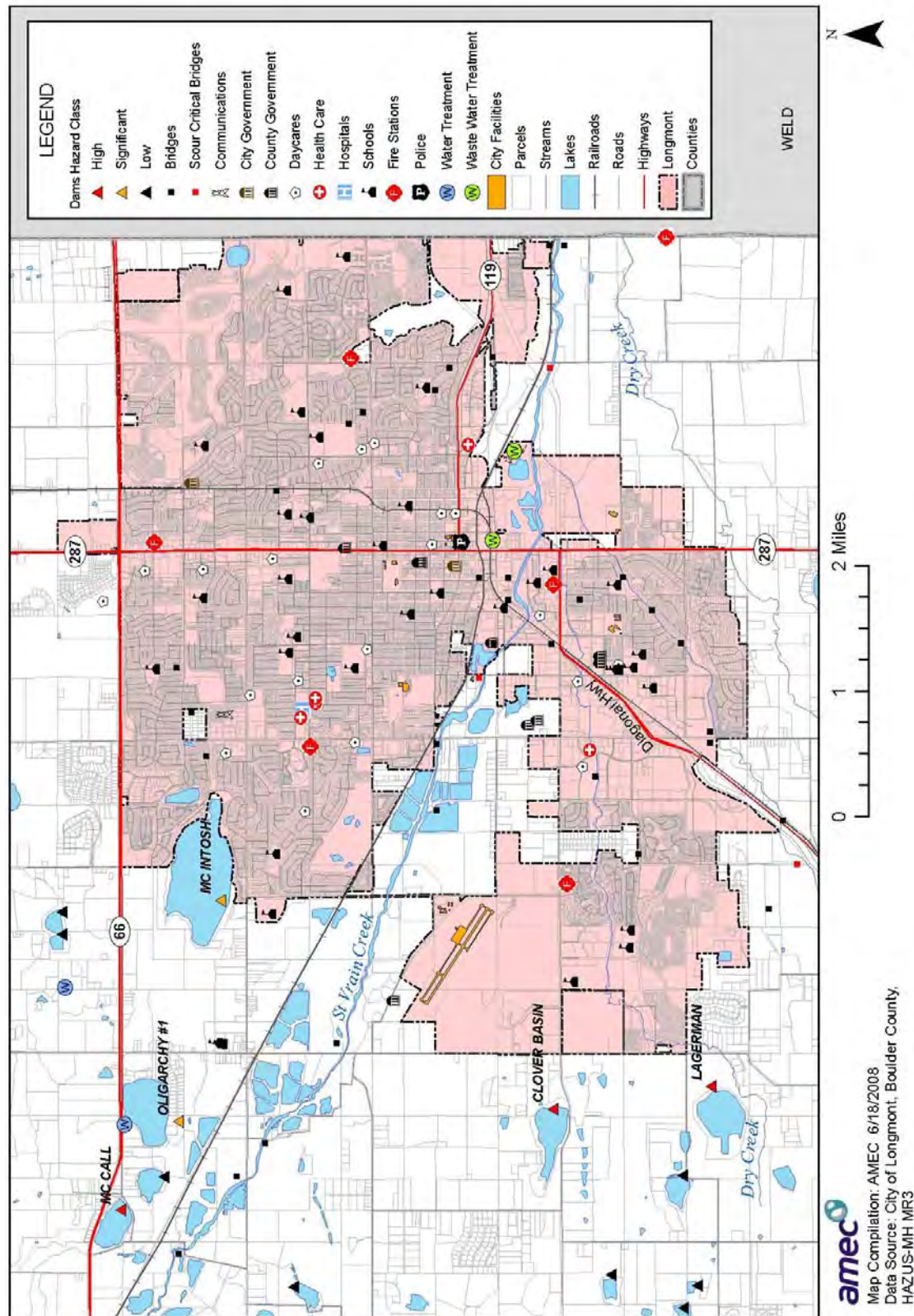
Table E.4 is a detailed inventory of assets identified by the City’s planning team. This inventory includes critical facilities. For more information about how “critical facility” is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table E.4. Summary of Longmont’s Critical Facilities in GIS

Critical Facility Type	Facility Count
Airport	1
Airport Runway	1
Bridges	25
City Government Buildings	28
Communications	1
County Government Buildings	7
Day Cares	19
Fire Stations	5
Health Care	5
Hospital	1
Police	1
Schools	35
Shelters	6
Waste Water Treatment	2
Water Storage Tank	1
Water Treatment	1
Total	139

Source: City of Longmont, Boulder County

Figure E.1. Longmont's Base Map and Critical Facilities



E.3.3 Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major employers are unable to return to normal operations, impacts ripple throughout the community.

Longmont's top employers as of June 2008 are listed in Table E.6.

Table E.6. Longmont Area's Top Employers

Company Name	Product	Employees
St. Vrain Valley Schools	School District	4,143
Seagate Technology	Computer Disk Drives	1,605
Longmont United Hospital	Regional Hospital	1,297
Butterball, LLC	Value Added Turkey Products	900
City of Longmont	City Government	816
Amgen	Biopharmaceuticals	809
Intrado	911 Database & Mapping Services	693
Crocs	Croc Shoes	625
McLane Western	Grocery Distribution Center	545
Federal Aviation Administration	Aviation Control Center	475
Xilinx	Programmable Logic (Software Division)	400
DigitalGlobe	Satellite Imagery	349
Longmont Clinic	Medical Services	302
Daily Times-Call	Newspaper And Printing	245
Circle Graphics	Digital Billboards	230
PharMerica	Regional Billing Office	203
Sunrise Medical Colorado Division	Wheelchairs	201
Measured Progress	Standardized Test Grading Firm	200
COPAN Systems Inc.	Hardware/Software Data Storage	150
Woodley's Fine Furniture	Household Furniture	140
Thule Organization Solutions	Computer/Audio/Video Storage Cases	135
Array BioPharma	Pharmaceutical Research	131
STMicroelectronics	Semiconductor Integrated Circuits	130
OnCore Manufacturing	Contract Manufacturer	130
nSpire Health, Inc.	Health Respiratory Products	120
Dot Hill Systems Corp.	Fiber Channel Computer Devices	116
Reliant Manufacturing	Contract Manufacturing	115
Sun Construction & Design	Construction & Design Services	110
Golden Triangle Construction	Construction	105
Mentor Graphics	Software Development	100

Source: Longmont Area Economic Council, www.longmont.org/

E.3.4 Natural, Cultural, and Historic Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Natural resources of importance in Longmont include Union Reservoir, Golden Ponds, Sandstone Ranch, Jim Hamm Park, St. Vrain Creek Corridor, Lefthand Corridor, Dry Creek Corridor, and Lake McIntosh. For information about natural resources in Boulder County, which includes Longmont, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

Table E.7 lists the properties in Longmont that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties (for more information about these registers, see Section 4.3 Vulnerability Assessment).

Table E.7. Longmont's Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Callahan, T. M., House	312 Terry Street	5/16/1985
Dickens Opera House	300 Main Street	7/28/1987
East Side Historic District	Bounded by Longs Peak Avenue, Collyer Street, 4 th Avenue, and Emery Street	10/2/1986
Empson Cannery	15 3rd Avenue	1/5/1984
Hoverhome and Hover Farmstead	1303-1309 Hover Road	1/15/1999
Longmont Carnegie Library	457 4 th Avenue	11/3/1992
Longmont College	546 Atwood Street	8/12/1987
Longmont Fire Department	667 4 th Avenue	5/16/1985
St. Stephen's Episcopal Church, 1881	470 Main Street	2/24/1975
West Side Historic District	Roughly bounded by 5 th , Terry, 3 rd , and Grant	1/7/1987

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/; National Register Information System, www.nr.nps.gov/

The City of Longmont currently has 120 designated historic structures located throughout the City. A structure may be designated for preservation if it has historical, architectural, or geographical

importance to the community. Table E.8 lists Longmont’s designated historic landmarks not already mentioned in Table E.7 above.

Table E.8. Additional Historic Landmarks in Longmont

Property	Address	Year Designated
3rd Avenue Grocery	1283 3rd Avenue	2000
A.M. Preston House	314 Bross Street	1985
Alex Bloom House	524 Emery Street	1999
Andrews House	719 Third Avenue	1985
Atwood-Jones House	503 Collyer Street	1987
Baker House	730 Kimbark Street	1999
Beckwith House	207 Bowen Street	1985
Bemis-Rowen House	545 Collyer Street	1985
Blakeslee House	202 Pratt Street	2006
Booth House	634 Emery Street	2001
Busch House	724 Collyer Street	2003
Carlson/Wallace Property	10662 Pike Road	1997
Carlton-Calkins Commercial Building	416 Main Street	1996
Carrie Rendahl House	511 Gay Street	2003
Central School	1000 Block Fourth Avenue	1976
Charles A. Ball House	1021 Third Avenue	1997
Charles Lewis House	517 Collyer Street	1989
Clawson House	535 Baker Street	2006
Corner House	600 Baker Street	1980
D.C. Donovan House	347 Pratt Street	1980
Davis-Price House	542 Collyer Street	2004
Dickens Homestead Barn/Root Cellar	136 S. Main Street	2004
Dobbins House	419 Collyer Street	1985
Dobbins/Pierce	509 Collyer Street	1995
E.B. Hanson	438 Collyer Street	1998
Earl Sprague House	902 Fifth Avenue	1987
Ed Jones Building	519 Fourth Avenue	2003
Emmons-Adler House	858 Third Avenue	1986
F.J. Miller/Lou Allen House	1236 Third Avenue	1987
Fox-Downer House	920 Third Avenue	1986
Friend Wright House	824 Collyer Street	1989
G.W. Booth House	1019 3rd Avenue	2003
George W. Allen House	703 Third Avenue	1978
German Congregational Church	641 Martin Street	2005
Golden-Miner House	817 Collyer Street	1988
Graham House	616 Baker Street	2004
Great Western Hotel	250 Kimbark	1993
Grosjean House	321 Gay Street	1995
H.P. Nelson House	306 Collyer Street	1995

Property	Address	Year Designated
H.W. Preston House	319 Bross Street	1988
Hartman-Greenamyre House	535 Collyer Street	2004
Higbee House	251 Gay Street	2006
Hildreth House	726 Kimbark Street	2001
Historic City Warehouse	375 Kimbark Street	2003
Historic Hover Farm (east portion)	1303 Hover Road	1994
Historic Longmont City Hall	505 Fourth Avenue	2001
Historic Longmont National Bank	400 Main Street	2004
Hover Farmstead (west portion)	1303 Hover Street	1996
Hover Home	1309 Hover Street	1997
Hubbard House	243 Pratt Street	1985
Imperial Hotel	301 Main Street	1977
J. Crawler House	734 Baker Street	1988
J.B. Thompson House	537 Terry Street	1980
J.E. Bump House	1117 Third Avenue	1987
J.J. Beasley/Sheeder Drug	372 Main Street	1990
J.M. Anderson House	436 Pratt Street	1991
James W. Bacon House	407 Bowen Street	1987
Jennings House	102 4th Avenue	2004
John Jr. and Nellie Townley House	960 5th Avenue	2003
Johnson/Gunning House	1206 Third Avenue	1995
Judge Secor House	247 Pratt Street	1988
Kistler/Gunning House	1005 Third Avenue	1995
Kiteley House	220 Ninth Avenue	1978
Kramer Home	1110 Longs Peak Avenue	1999
L.F. Steuerwald House	914 Third Avenue	1994
Library Hall	335 Pratt Street	1978
Lockling House	1130 Collyer Street	2004
Ludlow House	817 Third Avenue	1995
Lutes Drug Store	379 Main Street	1983
M.J. Perrin House	501 Emery Street	1985
Margaret Hertha House	615 Emery Street	1986
Masonic Temple	312 Main Street	1988
Mead House	502 Collyer Street	1978
Melinger-Spangler House	731 Collyer Street	2004
Miller House	428 Baker Street	2004
Mumford/Cole House	525 Collyer Street	1994
Nowlen Home	345 Mountain View	1998
O'Connor / Bragg House	415 Emery Street	2002
Old Allen House	924 Second Avenue	1978
Old City Electric Building	103 Main Street	1997
Old Mill Park	237-239 Pratt Street	1974
P.E. Hamm House	709 Third Avenue	1980
Park Hotel	246 Main Street	1997
Pike Road Barn	13076 Pike Road	1997

Property	Address	Year Designated
Presbyterian Church	402 Kimbark Street	1978
Pump House Brewery	540 Main Street	1996
Robert Stephens House	503 Bross Street	1977
S.D. Arms House	437 Collyer Street	1987
Secor Clarke home	318 Pratt Street	1999
Secor House	430 Pratt Street	2006
Slater House	608 Emery Street	2004
Smith-Abbott House	802 Baker Street	2004
Smith-Balliet House	545 Baker Street	2006
Spangler House	1032 Collyer Street	1981
Sprague-Large House	413 Collyer Street	1988
St. Stephens Episcopal Church	513 Emery Street	2002
Starbird-Hartman House	324 Eighth Avenue	1980
Sullivan-Mahony House	326 Bross Street	1986
Traylor Hardward	346 Main Street	1985
Trojan Theater	513 Main Street	1991
Turrell House	201-203 Bowen Street	1986
U.S. Post Office/American Legion	525 Third Avenue	1994
Van Zant-Fry House	1237 Third Avenue	1986
W.P.A. Post Office	501 Fifth Avenue	1988
Webb House	536 Collyer Street	1983
White-Smith House	426 Emery Street	2004
William Butler House	255 Pratt Street	1978
Williams-Pennock House	403 Collyer Street	1987
Wiswall-Denio House	902 Third Avenue	1977
Wymann-White House	420 Terry Street	2006
Young-Blum House	422 Pratt Street	2006
Zimbeck House	601 Collyer Street	1981

Source: Longmont Community Profile: Land, Construction and Housing, www.ci.longmont.co.us/planning/

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

E.4 Growth and Development Trends

Table E.9 illustrates how Longmont has grown in terms of population and number of housing units between 2000 and 2006. The table illustrates that Longmont is undergoing significant, and rapid, growth.

Table E.9. Longmont's Change in Population and Housing Units, 2000-2006

2000 Population	2006 Population Estimate	Estimated Percent Change 2000-2006	2000 # of Housing Units	2006 Estimated # of Housing Units	Estimated Percent Change 2000-2006
71,069	82,873	+16.61	27,385	33,203	+21.25

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/

E.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes Longmont's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

E.5.1 Mitigation Capabilities Summary

Table E.10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Longmont.

Table E.10. Longmont's Regulatory Mitigation Capabilities

Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	
Zoning ordinance	Yes	
Subdivision ordinance	????	
Growth management ordinance	????	
Floodplain ordinance	Yes	
Site plan review requirements	Yes	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	
BCEGS Rating	????	
Building code	Yes	
Fire department ISO rating	Yes	4
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Capital improvements plan	Yes	
Economic development plan	Yes	
Local emergency operations plan	Yes	
Other special plans	Yes	

Flood insurance study or other engineering study for streams	Yes	
Elevation certificates	Yes	
Other	Yes	

Table E.11 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Longmont.

Table E. 11 Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes		
Planner/engineer/scientist with an understanding of natural hazards	Yes		
Personnel skilled in GIS	Yes		
Full-time building official	Yes		
Floodplain manager	Yes		
Emergency manager	Yes		
Grant writer	No		
Other personnel	Yes		
GIS Data – Hazard areas	Yes	PWNR/GIS Coordinator	Flood Plain & Railroad
GIS Data – Critical facilities	Yes	ETS/SR GIS Analyst	City CIKY & Schools
GIS Data – Building footprints	Yes	ETS/SR GIS Analyst	Download from BoCo
GIS Data – Land use	Yes	ETS/SR GIS Analyst	
GIS Data – Links to assessor's data	Yes	BoCo Assessor	Download from BoCo
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes		

Table E.12 identifies financial tools or resources that Longmont could potentially use to help fund mitigation activities.

Table E. 12 Fiscal Mitigation Capabilities

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

bonds		
Incur debt through special tax bonds	Yes	With voter approval
Incur debt through private activities	Yes	With voter approval
Withhold spending in hazard-prone areas	Yes	
Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Longmont Area Comprehensive Plan, 2003
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Growth management ordinance	Yes	Quality of Life Benchmarks
Floodplain ordinance	Yes	
Site plan review requirements	Yes	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	
BCEGS Rating	Yes	
Building code	Yes	2006 International Building Code
Fire department ISO rating	Yes	Rating: 4
Erosion or sediment control program		
Stormwater management program		
Capital improvements plan	Yes	
Economic development plan	No	Under development (Fall 2008)
Local emergency operations plan	Yes	Being rewritten, last done in 2002
Other special plans	Yes	Open Space and Trails Master Plan, 2002; Water Supply and Drought Management Plan, 2007; Water Conservation Draft Master Plan, 2008
Flood insurance study or other engineering study for streams	Yes	
Elevation certificates	Yes	

E.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The City of Longmont joined the National Flood Insurance Program (NFIP) on July 5, 1977, and the Community Rating System (CRS) on October 1, 1992. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in communities that provide extra measures of flood above the minimum NFIP requirements. As of October 2007, Longmont had a CRS class rating of 8 (one a scale of 1-10, 1 being the best). This rating provides a 10 percent discount for policyholders within a special flood hazard area (SFHA) and a 5 percent discount for those outside of an SFHA.

NFIP insurance data indicates that as of February 29, 2008, there were 250 policies in force in Longmont, resulting in \$54,045,300 of insurance in force. Of these, 216 were for residential properties, and 181 were in A zones (special flood hazard areas).

In Longmont, there have been three historical claims for flood losses totaling \$2,260; two were for residential properties. Of the three losses, two were to pre-FIRM structures in B, C, or X zones, and the other was a post-FIRM structure in an A zone. There were no repetitive or severe repetitive loss structures.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Longmont activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

Longmont Area Comprehensive Plan, 2003

The Longmont Area Comprehensive Plan is the latest in the City of Longmont's efforts to plan for its future. It emphasizes sustainability, seeking to balance economic growth, community development, and environmental conservation to anticipate and accommodate the needs of current and future residents.

Goals and some of the associated policies that are most related to hazard mitigation include the following:

Goal: Achieve a compact urban form that uses land efficiently, is aesthetically pleasing, and minimizes undesirable impacts to the environment.

- Use the Longmont Area Comprehensive Plan and the City's land use regulations to promote overall moderate-intensity development that is sensitive to natural features and that will visually enhance the community.

Goal: Preserve environmental resources and unique natural areas.

- Encourage a growth pattern for the City that preserves unique and sensitive natural resources and areas.
- Promote site designs and techniques that minimize development's impacts on the natural environment.
- Encourage the use of floodplains and major drainage facilities for recreational use, open space, and other appropriate uses that preserve the natural environment and minimize the potential for property damage.

- Encourage wetlands preservation.

Goal: Reduce energy and water consumption.

Goal: Develop a greenway system of linear public open space that encompasses utility corridors, rivers, lakes, ditches and creeks used for storm water drainage, provides for the multiple uses of storm drainage corridors, assists in their efficient maintenance, accommodates trail-oriented recreation, and connects residential areas to the bikeway network and with community activity areas.

- Designate primary greenways that encompass utility corridors, rivers, lakes, ditches, and creeks that carry urban storm drainage when they can integrate with the bikeway system and can connect residential areas with community activity areas.

Goal: Preserve the natural and cultural resources of the Longmont area to help maintain the City's separate identity, provide connections to useable open space areas, provide low impact, passive recreation, and enhance scenic entryway corridors to the City.

- Use open space to preserve the natural and cultural resources of the Longmont area.

Municipal Code

Title 20 Floodplain Regulations

The purposes of this title are to promote the public health, safety, and general welfare; to minimize public and private flood losses due to flood conditions in areas subject to flood hazards; and to promote wise use of the floodplain by provisions designed to do the following:

Protect human life and health

Minimize expenditure of public money for costly flood-control projects

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

Minimize prolonged business interruptions

Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, and streets and bridges located in areas of special flood hazard

Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood-blight areas

Ensure that potential buyers are notified that property is in an area of special flood hazard

Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions

Protect floodplain occupants from a flood which is or may be caused by their own or other land use and which is or may be undertaken without full realization of the danger, through:

- Regulating the manner in which structures designed for human occupancy may be constructed so as to prevent danger to human life within such structures
- Regulating the method of construction of water supply and sanitation systems so as to prevent disease, contamination, and unsanitary conditions

- Delineating and describing areas that could be inundated by floods so as to protect individuals from purchasing floodplain lands for purposes which are not in fact suitable

Protect the public from the burden of avoidable financial expenditures for flood control and relief by:

- Regulating all uses within the floodplain areas so as to produce a method of construction and a pattern of development which will minimize the probability of damage to property and loss of life or injury to the inhabitants of the flood-hazard areas

Protect the storage capacity of floodplains and to assure retention of sufficient floodway area to convey flood flows which can reasonably be expected to occur by:

- Regulating filling, dumping, dredging and alteration of channels by deepening, widening or relocating
- Prohibiting unnecessary and damage-creating encroachment
- Encouraging uses such as agriculture, recreation and parking

Protect the hydraulic characteristics of the small watercourses, including the gulches, sloughs and artificial water channels used for conveying flood waters, which make up a portion of the urban drainage system, by:

- Regulating filling, dumping and channelization so as to maintain the natural storage capacity and slow flow characteristics
- Prohibiting encroachment into the small water-courses to maintain their water-carrying capacity
- Encouraging uses such as greenbelt, open space, recreation, and pedestrian and riding trails

Specifically, the regulations require a development permit for construction of development in all areas of the one-hundred-year flood within the corporate limits of the City, establishes the Floodway and Floodway Fringe districts, set use and development requirements for each district, and outline the duties and responsibilities of the chief building official and the Public Works director in administering this section.

Title 15 Land Development Code

The purposes of the development code, which includes the zoning, subdivision, and development standards ordinances, that are related to hazard mitigation include:

Promote the public health, safety, convenience, comfort, prosperity, and general welfare;
Secure the safety of persons and property from fire, flood, and other dangers;
Conserve and stabilize property values through appropriate land uses;
Preserve and protect existing trees and vegetation, agricultural lands, floodplains, stream corridors, wildlife habitats and corridors, wetlands, lakes and other water bodies, scenic views, and other areas of environmental significance from adverse impacts of development;

Promote environmental quality as a critical element in Longmont's quality of life and encourage the wise use of natural resources;
Facilitate the efficient provision of adequate public facilities (e.g., drainage);
Manage overall community growth.

Other

Longmont has a Voluntary Water Conservation Program and a 2008 Water Conservation Draft Master Plan.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No current projects/activities.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

In November of 2000, the citizens of Longmont voted to approve an additional 0.2 cent sales tax to be specifically used for the acquisition and development of Open Space in and around the community.

The Open Space and Trails Master Plan (2002) is the master plan for acquiring and managing land as open space.

The City of Longmont has contracted with Colorado Mosquito Control to implement an integrated pest management program to combat mosquitoes that might carry the West Nile Virus.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

Longmont's Outdoor Warning System consists of a series of public address speakers installed on top of poles located throughout the City. Other than for testing, the system will only be used to notify the community when immediate action should be taken.

The City's Storm Drainage System allows for efficient removal of storm water and snow melt from streets and properties.

The purposes of Longmont's 2013 Water Supply and Drought Management Plan (Drought Response Plan) (<http://www.longmontcolorado.gov/home/showdocument?id=1698>) are to manage the City's water supply and to anticipate, identify, and respond to drought in the Saint Vrain Creek watershed area. This plan evaluates the impact on raw water availability for the

City of Longmont and recommends responses to the current water supply and demand forecast. The plan also formalizes the City’s planning for future droughts. The City has a designated special needs shelter at the Longmont Recreation Center.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

The Public Works and Water Utilities Utility Engineering and Technical Services manages the administration, engineering, and planning for the City’s storm drainage utility and manages flood control.

The Longmont Storm Drainage Criteria Manual (1984) specifies the design and technical criteria for all drainage analysis and construction.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

The City’s Emergency Information web page provides information and links regarding emergency preparedness, evacuation, and relocation and other helpful resources.

Longmont has an eAlert subscription service that enables residents to sign up to receive information about local issues, including public safety and West Nile virus.

The City employs a part time fire safety education person.

Longmont has an emergency broadcast radio that operates on 1670AM

Table E 5.2.1 Longmont’s Property and Values in 100- and 500-Year Flood Zones

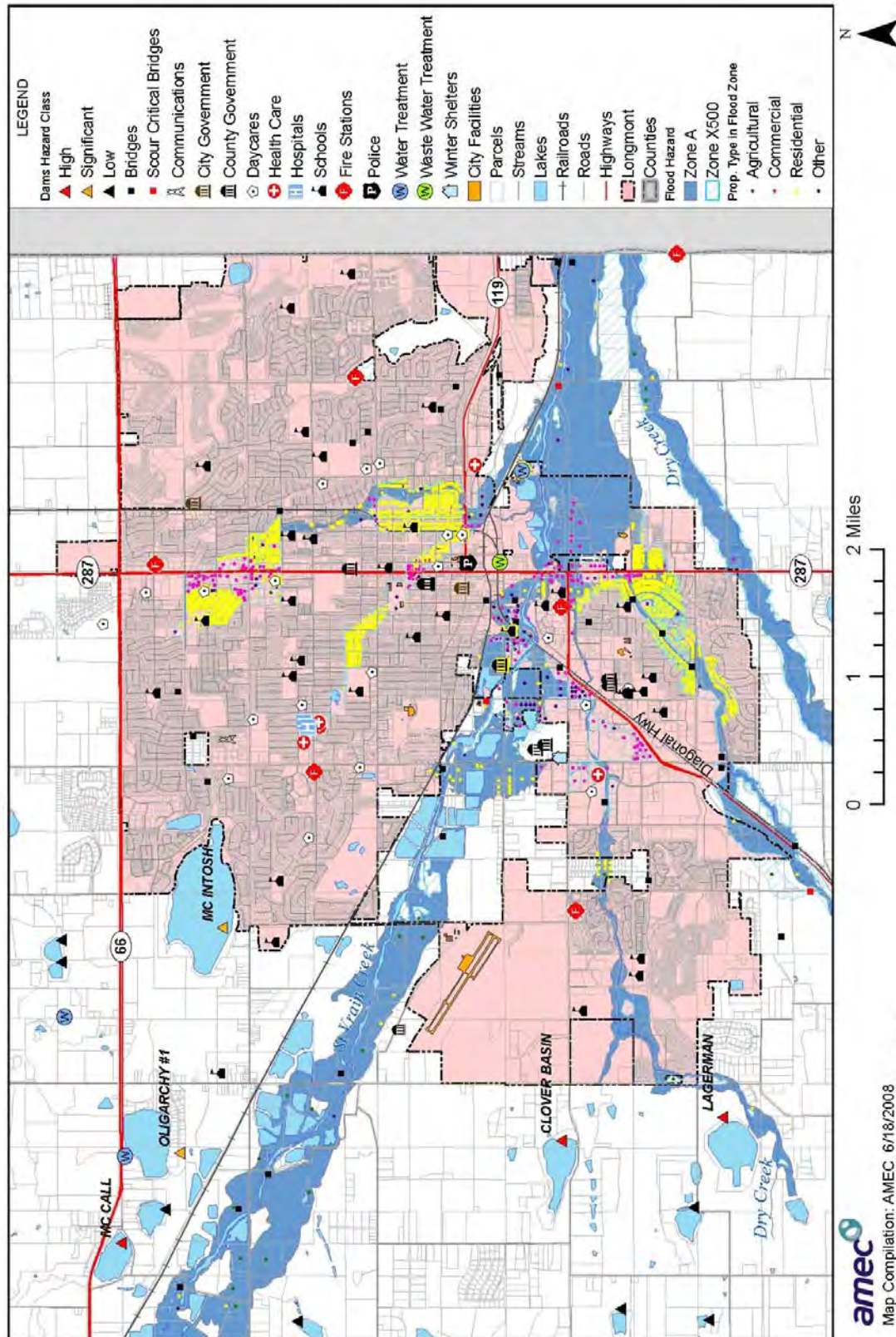
Longmont's Property and Values in 100- and 500-Year Flood Zones				
Property Type	Improved Parcel Count	Improved Value (\$)	Contents Value (\$)	Total Value (\$)
100-Year Flood Zone				
Residential	533	\$43,176,429	\$21,588,215	\$64,764,644
Commercial	62	\$31,286,500	\$15,643,250	\$46,929,750
Exempt	15	\$15,844,800	\$7,922,400	\$23,767,200
Industrial	33	\$22,576,800	\$11,288,400	\$33,865,200
Agricultural	0	\$0	\$0	\$0
Total	643	\$112,884,529	\$56,442,265	\$169,326,794
Population estimate for residences:		1274		
500-Year Flood Zone				
Residential	1902	\$212,190,060	\$106,095,030	\$318,285,090

Commercial	189	\$111,369,680	\$55,684,840	\$167,054,520
Exempt	28	\$36,962,900	\$18,481,450	\$55,444,350
Industrial	32	\$20,165,000	\$10,082,500	\$30,247,500
Agricultural	2	\$371,700	\$185,850	\$557,550
Total	2153	\$381,059,340	\$190,529,670	\$571,589,010
Population estimate for residences:		4546		

Combined 100- and 500-Year Flood Zones

Residential	2435	\$255,366,489	\$127,683,245	\$383,049,734
Commercial	251	\$142,656,180	\$71,328,090	\$213,984,270
Exempt	43	\$52,807,700	\$26,403,850	\$79,211,550
Industrial	65	\$42,741,800	\$21,370,900	\$64,112,700
Agricultural	2	\$371,700	\$185,850	\$557,550
Total	2796	\$493,943,869	\$246,971,935	\$740,915,804
Population estimate for residences:		5,820		

Figure E 5.2.2 Longmont Flood Hazard



Name of action - Airport Road Flood Protection Project (Western Boundary Flood Protection Project)

Hazards Addressed: Flooding

Mitigation Goal or Objective Addressed: Flood damage to the western portion of the City of Longmont caused by breeches in the St. Vrain Creek. This would also protect the community from flood flows to the north that could overtop McIntosh Reservoir and flow south and west to the same areas of the City.

Issue/Background: Flood damage such as that described above, occurred in the 2013 flood where flood flows breached the existing St. Vrain Creek channel and flowed to the north causing severe damage to private property and public infrastructure in several neighborhoods in western portions of the City.

Other Alternatives: None

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: \$2,000,000

Existing or Potential Funding: None

Benefits (avoided losses): This project would result in significant increased public safety and resiliency to the community protecting private property and public infrastructure and significant reduction in public safety risks due to future flooding events.

Potential or current subject matter expertise:

Schedule: No current schedule

Name of action

Hazards Addressed: Fire – Button Rock Preserve/Ralph Price Reservoir

Mitigation Goal or Objective Addressed: Reduction of fire risk at the Preserve around Ralph Price Reservoir, including forest thinning

Issue/Background: The Button Rock Preserve is a reservoir watershed with a mixed conifer forest comprised primarily of ponderosa pine interspersed with Douglas-fir. While fire is often beneficial for Front Range ecosystem health, decades of fire exclusion policy have increased the risk of extensive high severity stand replacing fires leading to a high threat to life, property, and infrastructure, as well as important natural resources and ecosystem services. Following the Big Elk fire adjacent to Button Rock

Preserve, the City began developing implementing the Button Rock Stewardship Plan in 2002 to preserve forest health and reduce the risks of catastrophic fires and noxious weed invasion. The plan outlines management actions in various areas in the preserve to achieve the forest health and safety goals including forest thinning. As an example, since 2004, 918 acres have been thinned to reduce wildfire risk. Additionally, the City has created the Wildfire Rehabilitation (Management) Plan to maximize the efficiency and effectiveness of both administrative and resource management actions following a fire within the Button Rock Preserve and its immediate surrounding area. Wildfire mitigation is important to protect the water quality in Ralph Price Reservoir as it is the City of Longmont's primary water supply.

Other Alternatives: None

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished. This is an on-going effort. The City has been thinning the forest since 2004.

Responsible Office: PWNRR

Priority (High, Medium, Low): High

Cost Estimate: \$75,000 - \$100,000 annually. Forest management and thinning is an on-going effort and currently costs between \$75,000 - \$100,000 annually based on the current level of effort

Existing or Potential Funding: Annual grants from Colorado State Forest Service (CSFS) and City funding from water rates. To date, these funding sources are the only ones available have limit the amount of thinning that can be accomplished annually.

Benefits (avoided losses): The mitigation efforts reduce fire fuels around Ralph Price Reservoir, which reduces the risk of large wildfires that can threaten Longmont's water supply.

Potential or current subject matter expertise: forest health, water supply water quality, forest thinning techniques, wildfire modeling

Schedule: Forest management and thinning has been underway since 2004 with 918 acres of thinning completed. An additional 10 – 15 years is needed to initially address all areas around in Preserve. On-going annual management of the forest will be needed.

Name of action - National Flood Insurance Program Community Rating System (CRS)

Hazards Addressed: Flooding

Mitigation Goal or Objective Addressed: Education, Flood Response , Floodplain mapping

Issue/Background: This is a FEMA program that is monitored by Insurance Services Office (ISO). The City provides services based on the Coordinator's Manual such as maintain elevation certificates, provide map information service and public information, floodplain mapping and flood response. The City presently has a rating of 8 which provides a 10% discount on flood insurance for residents in the 100-year floodplain.

Other Alternatives: Nono

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: The cost to the City is covered by existing salary and staffing

Existing or Potential Funding: Storm Drainage Fund

Benefits (avoided losses): Minimize flood risks, encourage flood insurance and reduce cost of flood insurance to property owners.

Potential or current subject matter expertise:

Schedule:

Name of action - St. Vrain Creek Overflow Channel west of City - Golden Property, Heron Lake Channel

Hazards Addressed: Flooding

Mitigation Goal or Objective Addressed: Flood damage to the western portion of the City of Longmont caused by breeches in the St. Vrain Creek.

Issue/Background: Flood damage such as that described above, occurred in the 2013 flood where flood flows breeched the existing St. Vrain Creek channel and flowed to the north causing severe damage to private property and public infrastructure in several neighborhoods in western portions of the City.

Other Alternatives: None

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: \$750,000

Existing or Potential Funding: \$750,000 Storm Drainage Fund

Benefits (avoided losses): This project would result in increased public safety and resiliency to the community protecting private property and public infrastructure and reduction in public safety risks due to future flooding events.

Potential or current subject matter expertise:

Schedule: Construction – February 2015 thru May, 2015

Name of action

Hazards Addressed: Flooding - Left Hand Creek at Kanemoto Park

Mitigation Goal or Objective Addressed: As part of the flood recovery efforts after the 2013 flood, mitigation actions were proposed as part of PW 1153 (original PW 1089 was combined into PW 1153) identified mitigation measures to relocate park amenities within the park to reduce the risk of future flood damage. As a mitigation measure to prevent future damage, the pump station is being relocated away from the creek. The additional cost resulting from the relocation of the pump station compared to pre-disaster conditions is the need to extend the electrical trenching and the 2 inch electrical conduit and wire including sleeves which is \$15,000. The cost of the additional parts needed for the pump station mitigation is \$6,800. The added design costs (Hines change order #1) for mitigation are \$4,400. Additionally, the swimming pool is being relocated from south of the pool buildings to the north side of the buildings, so it will no longer be located on the bank adjacent to the creek. In order to create room for the relocation of the pool, the playground must also be relocated. The additional mitigation costs to relocate the pool and the playground are approximately \$560,000. Additionally, the north embankment along the creek was not reconstructed creating more capacity for Left Hand Creek flows.

Issue/Background: Kanemoto Park is located adjacent to Left Hand Creek and is part of the north bank of the creek. The park is vulnerable to flooding events of Left Hand Creek. The 2013 flood resulted in the following damage at the park: loss of embankment which undermined and destroyed a kids activity pool, pool fencing, pool decking, sidewalks (paths), irrigation pump station, path lighting, electrical lines and breakers, park irrigation pipes, wires, irrigation valves and heads, and the turf/grass of a 1.5 acres multi-use playing field.

Other Alternatives: 1. Rebuild the embankment and amenities back to pre-flood conditions with no mitigation 2. Not rebuild the damaged amenities of the park

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: PWNR

Priority (High, Medium, Low): High

Cost Estimate: Approximately \$580,000

Existing or Potential Funding: FEMA Pilot Alternative Procedures Program Funding and City Funds (monthly \$2 Flood Recovery Fee for Parks and Greenways)

Benefits (avoided losses): The current mitigation efforts will prevent future damage to the larger amenities (pump station, playground and pool) in Left Hand Creek Park from floods similar to the 2013 event. The overall damage to the park is currently estimated to be around \$1.7 million (designs are still under development to determine exact costs).

Potential or current subject matter expertise: floodplain management, project management, pool designer, landscape architect, irrigation, engineers

Schedule: The repair of flood damage in the park was initiated in 2014 and is anticipated to be complete by the end of 2015.

Name of action - North Pipeline Reconstruction to minimize future flood damage

Hazards Addressed: Flood

Mitigation Goal or Objective Addressed: Protection of one of the City's primary raw water supplies from future flood damage

Issue/Background: This project will eliminate several pipe crossings of the creek that were created by the post flood channel. In places, the flood exposed some of the pipeline or reduced the cover over the pipe and this project will eliminate the new crossings or move the line away from the river.

Other Alternatives: None

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: \$3,500,000

Existing or Potential Funding: None

Benefits (avoided losses): Protection of one of the primary water supply lines to the City of Longmont's Nelson Flanders Water Treatment Plant that supplies treated water to Longmont, Boulder and various Boulder County water users.

Potential or current subject matter expertise:

Schedule: None

Name of action - Pressurization of the South St. Vrain Pipeline

Hazards Addressed: Any hazard that would impact the City's raw water supply

Mitigation Goal or Objective Addressed: Increased resiliency in the raw water supply to the City of Longmont

Issue/Background: Line the existing 24-inch South Pipeline and replace existing manholes with pressurized manholes to allow pressurization of pipe flow which will increase capacity of the pipeline. This would increase resiliency of the system so that if damage occurs to the North Line, more water could be delivered to the treatment plant through the South Line.

Other Alternatives: Develop of water sources

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: \$2,500,000

Existing or Potential Funding: None

Benefits (avoided losses): Increased resiliency in the raw water supply system that provides water to the City of Longmont Nelson Flanders Water Treatment Plant that that supplies treated water to Longmont, Boulder and various Boulder County water users.

Potential or current subject matter expertise:

Schedule: None

Name of action – South St. Vrain Pipeline Flood Repair

Hazards Addressed: Flooding

Mitigation Goal or Objective Addressed: Soil riprap and erosion control blankets for bank stabilization

Issue/Background: This section of the South St. Vrain Creek, the pipeline and the diversion were severely impacted by the flood, This is repair work to reestablish this critical raw water supply line for the City.

Other Alternatives: None

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: \$30,000

Existing or Potential Funding: FEMA Mitigation Funding, City and State Match

Benefits (avoided losses): Protection from further bank erosion

Potential or current subject matter expertise:

Schedule: Construction is underway and expected to be completed by end of April, 2015.

Name of action – St. Vrain Creek Improvement Project

Hazards Addressed: Flooding

Mitigation Goal or Objective Addressed: Increase in community safety and resiliency by increasing the capacity of the St. Vrain Creek channel to carry the 100 year flood flows for St. Vrain Creek through Longmont.

Issue/Background: The 100 year storm flows in the St. Vrain Creek through Longmont range from approximately 13,300 cfs at Airport Road to 17,700 cfs at County Line Road. The existing capacity of the Creek channel through the City is approximately 3,500 to 5,000 cfs resulting in a floodplain that is over half a mile in width impacting hundreds of individual properties and significant City infrastructure that will be damaged in any flood exceeding the capacity of the existing Creek channel. This was demonstrated during the 2013 flood event that caused over \$45 million in damage to the community in one event.

Other Alternatives: None

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: \$90,000,000

Existing or Potential Funding: There is currently an estimate of approximately \$50 million available leaving a current shortfall of approximately \$50 million.

Benefits (avoided losses): This project would result in significant increased public safety and resiliency to the community protecting private property and public infrastructure and significant reduction in public safety risks due to future flooding events.

Potential or current subject matter expertise:

Schedule:

Preliminary design – December 2014 thru May 2015

Final Design, Phase 1 – May 2015 thru January 2016

Construction, Phase 1 – February 2016 thru May 2017

Name of action – City of Longmont Wastewater Treatment Plant Flood Protection

Hazards Addressed: Flood

Mitigation Goal or Objective Addressed: Design and construction of a flood protection berm around the WWTP and mitigation efforts to protect individual buildings and operations.

Issue/Background: Flood damage at the WWTP from the 2013 flood event identified needs for protection of this critical City facility.

Other Alternatives: On site building specific mitigation efforts are proposed at various sites including sealing underground conduits, door dams, raising sump pump control panels, and various improvements to the site drainage system. In addition, a larger project to establish a berm around the entire site would be a larger facility specific effort of protection.

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Responsible Office: Public Works and Natural Resources Department

Priority (High, Medium, Low): High

Cost Estimate: Building specific improvements \$264,000. Berm around facility - \$1,100,000

Existing or Potential Funding: Sewer Fund

Benefits (avoided losses): Avoiding serious financial loss from damage at this critical City facility and avoiding potential environmental impacts of damage at the WWTP.

Potential or current subject matter expertise:

Schedule: The request for the building specific mitigation efforts is currently being reviewed by the State. Once approved, that could be implemented within a 12 to 18 month period. There is no funding or schedule for the larger berm project.

Mitigation actions by Agency	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
City of Longmont						
Continue to implement sound floodplain management practices as communities participating in the NFIP	Longmont Department of Public Works and Natural Resources	Y / ☒ N	☒ / N		High	High
CERT	Longmont OEM	☒ / N	☒ / N		High	Medium
Fire Mitigation at Buttonrock	Longmont Department of Public Works and Natural Res.	Y / ☒ N	Y / ☒ N		High	High
City of Longmont Wastewater Treatment Plant Flood Protection	Longmont Department of Public Works and Natural Res.					
St. Vrain Creek Improvement Project	Longmont Department of Public Works & Natural Res					
South St. Vrain Pipeline Flood Repair	Longmont Department of Public Works & Natural Res					
Pressurization of the South St. Vrain Pipeline	Longmont Department of Public Works & Natural Res					
North Pipeline Reconstruction to minimize future flood damage	Longmont Department of Public Works and Natural Res.					
St. Vrain Creek Overflow Channel west of City - Golden Property, Heron Lake Channel	Longmont Department of Public Works & Natural Res					
National Flood Insurance Program Community Rating System (CRS)	Longmont Department of Public Works & Natural Res					
Airport Road Flood Protection Project (Western Boundary Flood Protection Project)	Longmont Department of Public Works and Natural Res.					

Annex F: Louisville

F.1 Community Profile

The City of Louisville is a home rule municipality with 7.9 square miles within the municipal boundaries. The City lies in southeastern Boulder County roughly six miles east of the City of Boulder and 25 miles northwest of Denver. The Louisville area is characterized by generally flat lands and low hills with some gently rolling terrain trending toward Coal Creek and Rock Creek.

The City of Louisville's history is based on coal mines and the coal mining industry. Louisville is an area that was known as the Northern Coal Field, an extensive coal field in Boulder and Weld counties. In August 1877 the first coal mine was opened and Louis Nawatny, a land owner in the area, platted his farmland into the town and named it after himself. Coal miners moved to the new town to work in the new, safer mine. Because mining was seasonal, and strikes too often interrupted production, the economy was generally depressed. Family gardens and odd jobs were the way of life during summertime unemployment.

From 1890 to 1928, the Acme Mine operated directly beneath the original town of Louisville. Worked on two levels, the Acme produced nearly two million tons of coal and was one of 171 coal mines in Boulder County. There were 30 mines that opened in and around Louisville. During the peak years of 1907 to 1909, there were 12 mines in operation. The use of coal declined following World War II, and the last mines near Louisville closed in 1952.

The community has become a middle-class haven where the workers leave for all manner of jobs in every direction. In recent years, manufacturing plants have opened in Louisville providing employment opportunities and attracting new residents.

F.1.1 Population

The estimated 2006 population of the City of Louisville was 18,577. Select Census 2000 demographic and social characteristics for Louisville are shown in Table F.1.

Table F.1. Louisville's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	49.7
Female (%)	50.3
Under 5 Years (%)	6.3
65 Years and Over (%)	6.1
Race/Ethnicity (one race)	
White (%)	91.2
Hispanic or Latino (Of Any Race) (%)	5.0
Other	
Average Household Size	2.61
High School Graduate or Higher (%)	96.3

Source: U.S. Census Bureau, 2000, www.census.gov/

F.1.2 Economy

According to the 2000 Census, the industries that employed most of Louisville's labor force were educational, health and social services (20.1%); professional, scientific, management, administrative and waste management services (17.5%); manufacturing (16.2%); and retail trade (10%). Select economic characteristics for Louisville from the 2000 Census are shown in Table F.2.

Table F.2. Louisville's Economic Characteristics

Characteristic	
Families below Poverty Level, 1999	101
Individuals below Poverty Level, 1999	556
Median Home Value	\$237,200
Median Household Income, 1999	\$69,945
Per Capita Income, 1999	\$31,828
Population in Labor Force	10,947

Source: U.S. Census Bureau (2000), www.census.gov/

F.2 Hazard Summary

The most significant hazards for Louisville are floods, expansive soils, land subsidence, severe winter storm and wildfire. Refer to Section 4.3 Vulnerability Assessment for detailed vulnerability to the flood hazard. Due to the historical coal mining in the area subsidence of the land surface is a concern in Louisville. Other hazards that could impact Louisville include dam failure, drought, hailstorm, earthquake, extreme heat, lightning, tornado, windstorm, West Nile Virus and Pandemic Flu.

F.3 Asset Inventory

F.3.1 Property Inventory

Table F.3 represents an inventory of property in Louisville based on the Boulder County Assessor's data as of March 12, 2008.

Table F.3. Louisville's Property Inventory

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	6,666	786,100,800	6,612	1,500,237,500	2,286,338,300
Commercial	289	143,922,300	257	279,971,600	423,893,900
Industrial	103	44,356,400	96	157,046,400	201,402,800
Exempt	302	76,376,900	56	83,756,000	160,132,900
Agricultural	64	54,800	7	1,865,500	1,920,300
Vacant	152	39,850,000	0	0	39,850,000
Minerals	40	16,200	0	0	16,200
State Assessed	11	0	0	0	0
Unknown	10	0	0	0	0
Total	7,637	1,090,677,400	7,028	2,022,877,000	3,113,554,400

Source: Boulder County Assessor's Office

F.3.2 Other Assets

Table F.4 is a detailed inventory of assets identified by the City's planning team. This inventory includes critical facilities. For more information about how "critical facility" is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table F.4. Louisville's Assets

Name of Asset	Type	Address	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Avista Hospital	Essential				
Centennial Peaks Mental Hospital	Essential				
Louisville Fire Department 1	Essential				
Louisville Fire Department 2	Essential				
Louisville Police & Court Building	Essential				
Schools- Boulder Valley School District	High potential loss				
Belfore Nursing Home	High potential loss				
Wellspring Nursing home	High potential loss				
Harper Lake Dam	High potential loss				

Name of Asset	Type	Address	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
Louisville City Hall	High potential loss				
Louisville Public Works Shops	High potential loss				
Louisville Library	High potential loss				
Louisville Elementary School	High potential loss				
Coal Creek Elementary School	High potential loss				
Monarch K-8 School	High potential loss				
Louisville Middle School	High potential loss				
Monarch High School	High potential loss				
Saint Louis School	High potential loss				
Balfour Senior Care Campus	High potential loss				
Wellspring	High potential loss				
La Petite Academy	High potential loss				
La Petite Academy	High potential loss				
KinderCare 1	High potential loss				
KinderCare 2	High potential loss				
Louisville Montessori	High potential loss				
Bright Horizons	High potential loss				
CTC Industrial Park	High potential loss				
Excel Natural Gas Pumping Stations	High potential loss				
Louisville Water Storage-Marshall	Lifeline				
Louisville Waste Water Pumping Stations	Lifeline				
Waste Water Treatment Plan	Lifeline				
Water Treatment Main	Lifeline				
Water Treatment North	Lifeline				
Burlington Northern Railroad	Transportation				
Highway 36	Transportation				
RTD Park & Ride	Transportation				
Conoco-Phillips	Economic				
Centennial Valley	Economic				
La Quinta Inn	Economic				
Hampton Inn	Economic				
Comfort Inn	Economic				
Residence Inn by Marriot	Economic				
Courtyard by Marriott	Economic				

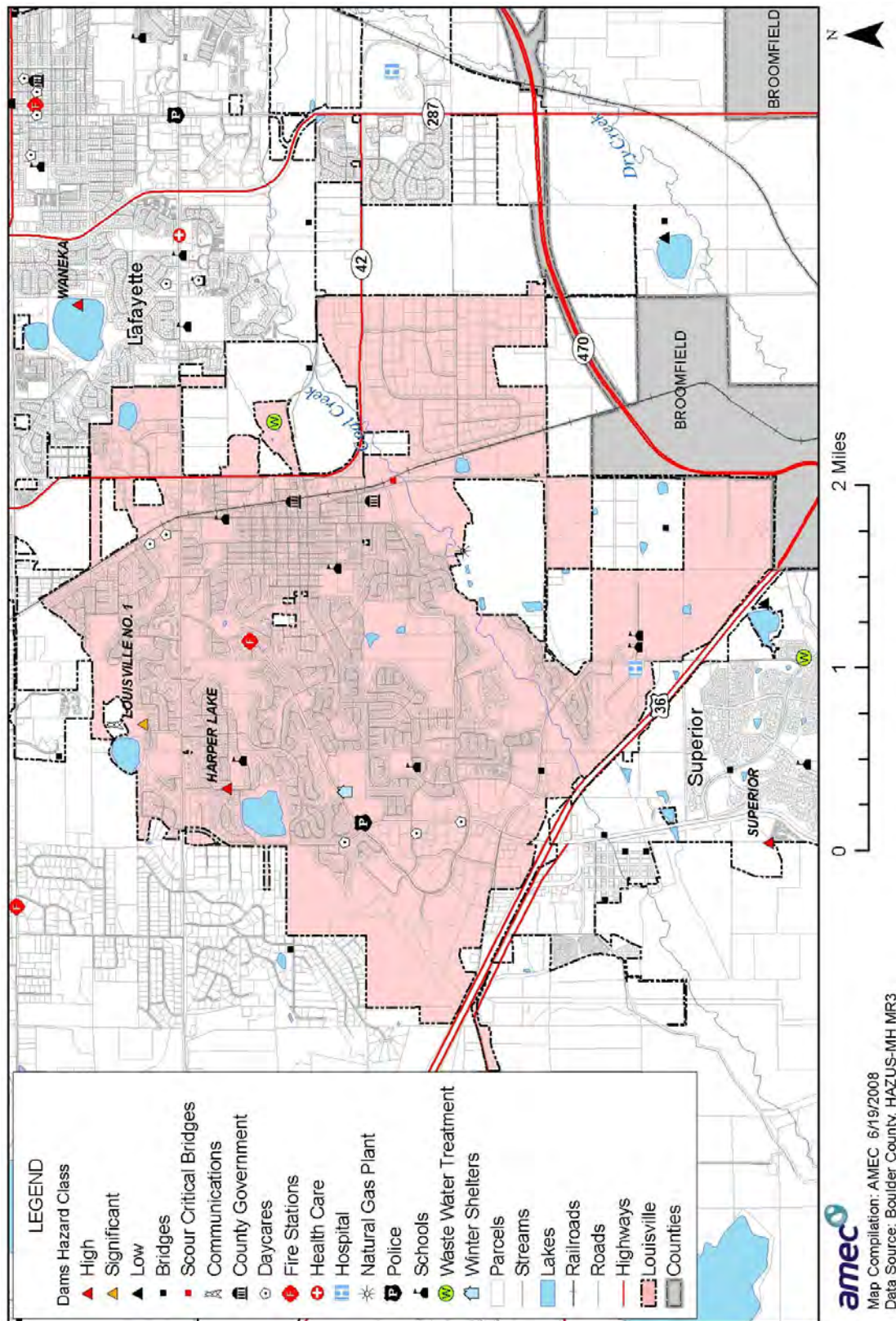
Many of the facilities listed above are also in GIS databases provided by and Boulder County. Critical facility counts and types are shown in Table F.5 and in the map in Figure F.1. Shelters may be in facilities such as schools or recreation centers and are not indicated on the map.

Table F.5. Summary of Louisville’s Critical Facilities in GIS

Critical Facility Type	Facility Count
Municipal Government Buildings	5
Bridges	3
County Government Buildings	2
Dams	1
Daycare Centers	7
Fire Stations	2
Hospital	2
Police	1
Schools	6
Shelters	1
Water Treatment	3
Waste Water Treatment	1
Winter Shelters	1
Total	24

Source: Boulder County and City of Louisville

Figure F.1. Louisville's Base Map and Critical Facilities



F.3.3 Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major employers are unable to return to normal operations, impacts ripple throughout the community.

According to the 2007 Louisville Community Profile from the Denver Regional Council of Governments, the following are Louisville's major employers. In addition, Conoco-Phillips is scheduled to begin construction in 2008 of a research center at the former Storage Technology site.

Conoco-Phillips Research Center
Kable Fulfillment Services Inc.
Avista Hospital
Boulder Valley School District
EDS Resource Management Corporation
City of Louisville
Home Depot
Lowe's
Raindance Communications Inc.
Inovonics Corporation

F.3.4 Natural, Historic, and Cultural Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Floodplains along Coal and Rock creeks hold relatively intact riparian corridors that are critical for flood protection, wildlife movement, and the aquatic health of the streams. Most of Louisville's lands within the 100-year floodplain are in public ownership (parks and open space) or agriculture. Boulder County

and the Colorado Natural Heritage Program have not identified any rare, endangered, threatened, imperiled plant and animal species or critical wildlife habitats within the City limits or on City open space. The Colorado Tallgrass Prairie Natural Area lies just to the west of the City. Prebles Meadow jumping mice are found along Coal Creek, but not in the segment through Louisville.

For information about natural resources in Boulder County, which includes Louisville, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

Table F.6 lists the properties in Louisville that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties (for more information about these registers, see Section 4.3 Vulnerability Assessment).

Table F.6. Louisville's Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Denver Elevator--Grain Elevator	Tract 712 near CO 42	2/14/1986
Ginacci House	1116 LaFarge Street	2/14/1986
Jacoe Store	1001 Main Street	2/14/1986
Lackner's Tavern	1006 Pine	2/14/1986
LaSalla House	1124 Main Street	2/14/1986
National Fuel Company Store	801 Main Street	2/14/1986
Petrelli--DelPizzo House	1016 Main Street	2/14/1986
Rhoades House	1024 Grant	2/14/1986
Robinson House	301 Spruce	2/14/1986
Stolmes House	616 Front Street	2/14/1986
Tego Brothers Drugstore--State National Bank of Louisville	700 Main Street	2/14/1986
Thomas House	700 Lincoln	2/14/1986

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/; National Register Information System, www.nr.nps.gov/

Additionally, six properties have been designated as Louisville historic landmarks (Table F.7).

Table F.7. Louisville's Historic Landmarks

Property	Address	Year Designated
Austin-Niehoff House	717 Main Street	9/6/2005
Louisville Center for the Arts	801 Grant Avenue	9/6/2005
Jacoe Store	1001 Main Street	9/20/2005
Tomeo House	1001 Main Street	9/20/2005
Jordinelli House	1001 Main Street	9/20/2005
Jannucci House	1116 LaFarge Avenue	4/15/2008

Source: City of Louisville Historic Preservation Commission, www.ci.louisville.co.us/Boards/preservationcmsn.htm

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

F.4 Growth and Development Trends

Table F.8 illustrates how Louisville has grown in terms of population and number of housing units between 2000 and 2006.

Table F.8. Louisville's Change in Population and Housing Units, 2000-2006

2000 Population	2006 Population Estimate	Estimated Percent Change 2000-2006	2000 # of Housing Units	2006 Estimated # of Housing Units	Estimated Percent Change 2000-2006
18,937	18,577	-1.90	7,389	7,626	+3.21

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/

According to the City's comprehensive plan, limited growth in Louisville between 2000 and 2005 can be attributed to the fact that most residential land supplies had not completed the entitlement process. The plan also estimated that based on current zoning, the City would be built out at a population of 20,336 (assuming 2.6 people per household).

F.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes Louisville's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation

efforts as they pertain to the National Flood Insurance Program’s Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

F.5.1 Mitigation Capabilities Summary

Table F.9 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Louisville.

Table F.9. Louisville’s Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Louisville Comprehensive Plan, 2005
Zoning ordinance	Yes	Louisville Municipal Code
Subdivision ordinance	Yes	Louisville Municipal Code
Growth management ordinance	Yes	Louisville Comprehensive Plan, 2005
Site plan review requirements		Louisville Municipal Code
Floodplain ordinance	Yes	Louisville Municipal Code
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Louisville Municipal Code and Louisville Public Works
Building code	Yes	International Building Code, 2003
BCEGS Rating		
Fire department ISO rating	Yes	
Erosion or sediment control program	Yes	Louisville Land Management
Stormwater management program	Yes	Louisville Public Works
Capital improvements plan	Yes	Louisville Public Works
Economic development plan		Office of Louisville City Manager
Local emergency operations plan	Yes	Louisville Police Department
Other special plans	Yes	Drought Management Plan, Open Space Master Plan, Comprehensive Plan of Fire and Emergency Services 2005-2015
Flood insurance study or other engineering study for streams	Yes	FEMA Flood Insurance Study, October 4, 2002
Elevation certificates	No	

Table F.10 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Louisville.

Table F.10. Louisville’s Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	City of Louisville	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	City of Louisville	
Planner/engineer/scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		

Personnel Resources	Yes/No	Department/Position	Comments
Full-time building official	Yes	City of Louisville	
Floodplain manager	Yes	City of Louisville	
Emergency manager	No		
Grant writer	Yes	City of Louisville	
Other personnel	No		
GIS Data – Hazard areas	No		
GIS Data – Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to assessor's data	No		
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes		

Table F.11 identifies financial tools or resources that Louisville could potentially use to help fund mitigation activities.

Table F.11. Louisville's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	Yes	
Capital improvements project funding	Yes	
Authority to levy taxes for specific purposes	No	
Fees for water, sewer, gas, or electric services	No	
Impact fees for new development	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	No	
Incur debt through private activities	No	
Withhold spending in hazard-prone areas	No	

F.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The City of Louisville joined the National Flood Insurance Program (NFIP) on May 4, 1973. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. Community Rating System (CRS) on The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in communities that provide extra measures of flood above the minimum NFIP requirements. As of October 2007, Louisville had a CRS class rating of 8 (one a scale of 1-10, 1 being the best). This rating provides a 10 percent discount for policyholders within a special flood hazard area (SFHA) and a 5 percent discount for those outside of an SFHA.

NFIP insurance data indicates that as of February 29, 2008, there were 22 policies in force in Louisville, resulting in \$7,752,000 of insurance in force. Of these, 16 were for residential properties (all but 2 were single-family homes), and 10 were in A zones (special flood hazard areas). In Louisville, there have not been any historical claims for flood losses, thus there were no repetitive or severe repetitive losses.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Louisville activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

City of Louisville Comprehensive Plan (2012)

The City's comprehensive plan gives general guidance, establishing a flexible framework of community-based principles, policies, and implementation strategies adopted by the Planning Commission and City Council to realize the community's vision for the City. The principles and policies contained within the plan cover a broad range of subject matter related to services, issues, and geographic areas within Louisville. Combined, these elements serve to direct future policy decisions to preserve vital community attributes and service levels and manage growth.

The following principles and related policies are most relevant to hazard mitigation.

Principle: The City should maintain a compact urban form to use land efficiently.

- The City reviews and revises development regulations as needed to promote a high quality of design, redevelopment, mixed-use development, multi-modal transportation opportunities and the protection of natural features.

Principle: As developable land becomes scarcer, underutilized commercial areas will provide opportunities for redevelopment and revitalization that promote economic growth while preserving land use entitlements and property values of adjacent areas.

- Land use patterns and intensities have been designated so as to not adversely impact identified natural resources, wildlife habitats, and historic sites.
- Development is planned and reviewed to discourage from locating in areas characterized by natural or geologic hazards.

Principle: The City collaborates with Boulder County, Broomfield County, adjacent municipalities, the private sector, and other agencies and non-profit organizations to purchase, preserve and enhance lands for public use.

- The City works with neighboring governments, developers, trusts and landowners to preserve open space through dedications, donations, conservation easements, and intergovernmental agreements or other methods deemed to be in the interest of Louisville residents.
- The City supports collaboration between the City’s Land Management Department, citizen advisory boards and commissions, other City departments, and neighboring jurisdictions to foster cooperation and efficiency in parks, open space, and trail implementation and management.
- The management of Louisville open space is consistent with sound ecological principles and attempts to conserve native plants and wildlife habitats.
- Land use patterns and intensities are designated so as to not adversely impact identified natural resources, landforms, water bodies, wildlife habitats, and historic sites.
- City facilities, parks, trails, and trailheads are planned, designed, and constructed so as to minimize the degradation of natural and cultural resources, especially riparian areas and associated wildlife habitats.

Principle: The City provides adequate public facilities, water, sewer, and related services to meet the demand of existing needs, and plans for future expansions as necessary for residential and commercial and industrial growth.

- The City ensures that its storm drainage and wastewater treatment system is adequate to meet the demands of existing and planned development.

Principle: The City believes the health and safety of the community is a primary objective of government.

- The City is committed to maintaining its police force level of service to ensure the safety of the community.
- The City works collaboratively with the fire protection district to ensure preservation of life and property through fire prevention, fire suppression, hazardous materials response and emergency medical services support.
- The City works with the Boulder County Health Department to ensure that public health services are available to residents of all ages.

Principle: The City works in cooperation with the Louisville Resource Conservation Advisory Board in evaluating resource conservation, sustainable building practices and efficient use of natural resources.

- The City encourages activities that lead to the efficient use of water and energy.

Municipal Code

Title 17 Zoning (Includes Floodplain Zoning)

This ordinance was enacted to promote the health, safety, morals, convenience, order, prosperity, and welfare of the present and future inhabitants of the City by securing safety from fire and other dangers and facilitating the adequate provision of public services through the classification of land uses and the

distribution of land development and utilization (among other things). Specifically, it promotes coordinated and sound development, provides for higher quality in site and land planning, conserves open space, and provides more efficient and attractive use of open space.

This title includes the floodplain regulations, which further the purposes of the title, by minimizing flood losses in areas subject to flood hazards and promoting wise use of the floodplain. These regulations are intended to:

Reduce the hazard of floods to life and property by:

- Prohibiting uses which are dangerous to life or property and/or which are hazardous to the public in time of flood
- Restricting uses which are particularly susceptible to flood damage, so as to alleviate hardship and eliminate demands for public expenditures for relief and protection
- Requiring permitted floodplain uses, including public facilities which serve such uses, to be protected against floods by providing floodproofing and general flood protection at the time of initial construction

Alert floodplain occupants or potential occupants to flood hazards and damages which may result from their own, or other, land use and which are or may be undertaken without full realization of the danger by:

- Regulating the manner in which structures designed for human occupancy may be constructed
- Regulating the method of construction of water supply systems, sanitation systems and other utilities so as to prevent disease, contamination and unsanitary conditions
- Delineating and describing areas that could be inundated by floods so as to protect individuals from purchasing floodplain lands for purposes which are not in fact suitable

Protect the public from the burden of avoidable financial expenditures for flood control and relief by regulating all uses within the floodplain areas so as to produce a method of construction and a pattern of development which will minimize the probability of damage to property and loss of life or injury to the inhabitants of the flood hazard areas

Protect the storage capacity of floodplains and to assure retention of sufficient floodway area to convey flood flows which can reasonably be expected to occur by:

- Regulating filling, dumping, dredging and alteration of channels by deepening, widening, or relocating
- Prohibiting unnecessary and damage-creating encroachments
- Encouraging open space uses such as agriculture and recreation

Protect the hydraulic characteristics of the small watercourses, including the gulches, sloughs and artificial water channels used for conveying floodwaters, which make up a portion of the urban drainage system by:

- Regulating filling, dumping and channelization so as to maintain natural storage capacity and slow flow characteristics

- Prohibiting encroachment into the small watercourses to maintain their water-carrying capacity
- Encouraging uses such as greenbelt, open space, recreation and riding trails

Specifically, the regulations require a floodplain development permit before any new land use, construction, or development begins within the flood regulatory district (as defined in the code) or area of special flood hazard, outline the duties and responsibilities of the planning director in administering the regulations, and set standards for flood hazard reduction, including anchoring, construction materials and methods, design and location of utilities, subdivision proposals, elevation (base flood elevation), floodproofing, manufactured homes, and recreational vehicles.

Other Regulations

Title 4 City Open Space—This title establishes a board of citizens to advise City staff and council on matters related to the acquisition, management, restoration, preservation, and use of open space lands and establishes standards for the acquisition, management, restoration, use, and preservation of such open space lands.

Title 13 Water and Sewers—This title includes provisions to construct, operate, and maintain stormwater facilities and to establish a methodology and requirement for the payment of reasonable stormwater utility fees for property owners to pay for a share of the costs of improvements and facilities reasonably necessary to manage stormwater. Furthermore, it promotes the general public health, safety, and welfare by reducing the potential for the movement of emergency vehicles to be impeded or inhibited during storm or flooding periods; by minimizing storm and flood losses, inconvenience, and damage resulting from runoff; and by promoting activities which improve the water quality of runoff in the City of Louisville.

Title 16 Subdivisions—Among the purposes of these regulations, as they relate to hazard mitigation, are the following:

- To promote the health, safety, convenience, order, prosperity and welfare of the present and future inhabitants of the City
- To promote orderly growth and to provide for the harmonious development of the City in accordance with its comprehensive plan
- To provide for adequate light, air, and privacy and to secure safety from fire, flood, and other danger
- To ensure that public facilities and services are available and will have sufficient capacity to serve the development
- To mitigate the pollution of air, streams, and ponds; assure the adequacy of drainage facilities; safeguard the water table; and encourage the wise use and management of the natural environment
- To preserve and enhance to the extent reasonably possible the natural beauty and topography of the City and areas of historical or archeological importance and to ensure

appropriate development with regard to such natural, historical and archaeological sites and features

- To otherwise plan for and regulate the use of land so as to provide planned and orderly use of land and protection of the environment in a manner consistent with constitutional rights

Design standards require consideration of steep land, areas having inadequate drainage, and other natural hazard areas and limit development as necessary.

Other

Most areas identified as geologic hazard areas are protected as open space, thus prohibiting development.

The City's Engineering Department has an ongoing maintenance program for inspecting storm drainage facilities. The department also provides detailed hydraulic modeling to identify any deficiencies and what improvements are necessary. The City is currently following the Louisville/Boulder County Outfall System Plan, as completed in 1982, for necessary improvements to the stormwater system. Developers are responsible for completing elements of the outfall system to meet the City's land development and engineering codes.

The City's Stormwater Storm Drainage Design and Technical Criteria (1982) presents the minimum design and technical criteria for the analysis and design of storm drainage systems.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No current projects/activities.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

The City provides a balanced system of open space composed of environmentally sensitive areas, natural areas, wildlife corridors, habitat areas, trails, and greenways using a variety of conservation methods to meet both the needs of the citizens and the City's resource protection goals.

The City's Open Space Master Plan inventoried, classified, and provided management direction for 26 City-owned and 10 jointly owned properties. While it provides detailed direction for managing and enhancing the cultural, agricultural, recreational, and ecological resources, it does not target any land for future acquisition.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

The City's Drought Management Plan (2014)

(<http://www.louisvilleco.gov/Portals/0/Public%20Works/droughtmgmtplan.pdf>) is a guide for the varying degrees of drought experienced in the normal variations of weather patterns. It identifies the conditions that formally place the City in a designated level of drought and pre-determine the general responses appropriate for given drought conditions. It also establishes the general framework for when drought conditions require special communications with residents and the type of information anticipated to be communicated.

The Louisville Fire Protection District provides fire protection and emergency medical services through a predominantly volunteer staff. The district has a comprehensive plan of fire and emergency services 2005–2015. The purposes of the plan are to provide a framework to review the basic organizational and performance requirements of the fire department, identify goals and objectives, and use as a basis to project programming and fire service policy.

The City's Public Works Operations Division has a Snow Control Plan to keep streets safe and accessible during periods of ice and snow. The goal is to provide snow and ice control services on all major City streets and to plow selected streets through subdivisions to provide access and egress to citizens' homes. Streets are cleared according to established priorities. Priorities are set based on traffic volume, public safety, and access to emergency facilities and schools.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

No current projects/activities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

The City's Planning Department invites property owners to visit its office or email them for information regarding whether or not their property is in a flood zone (and if so, which one). A flood insurance rate map information form is available on the City's web site.

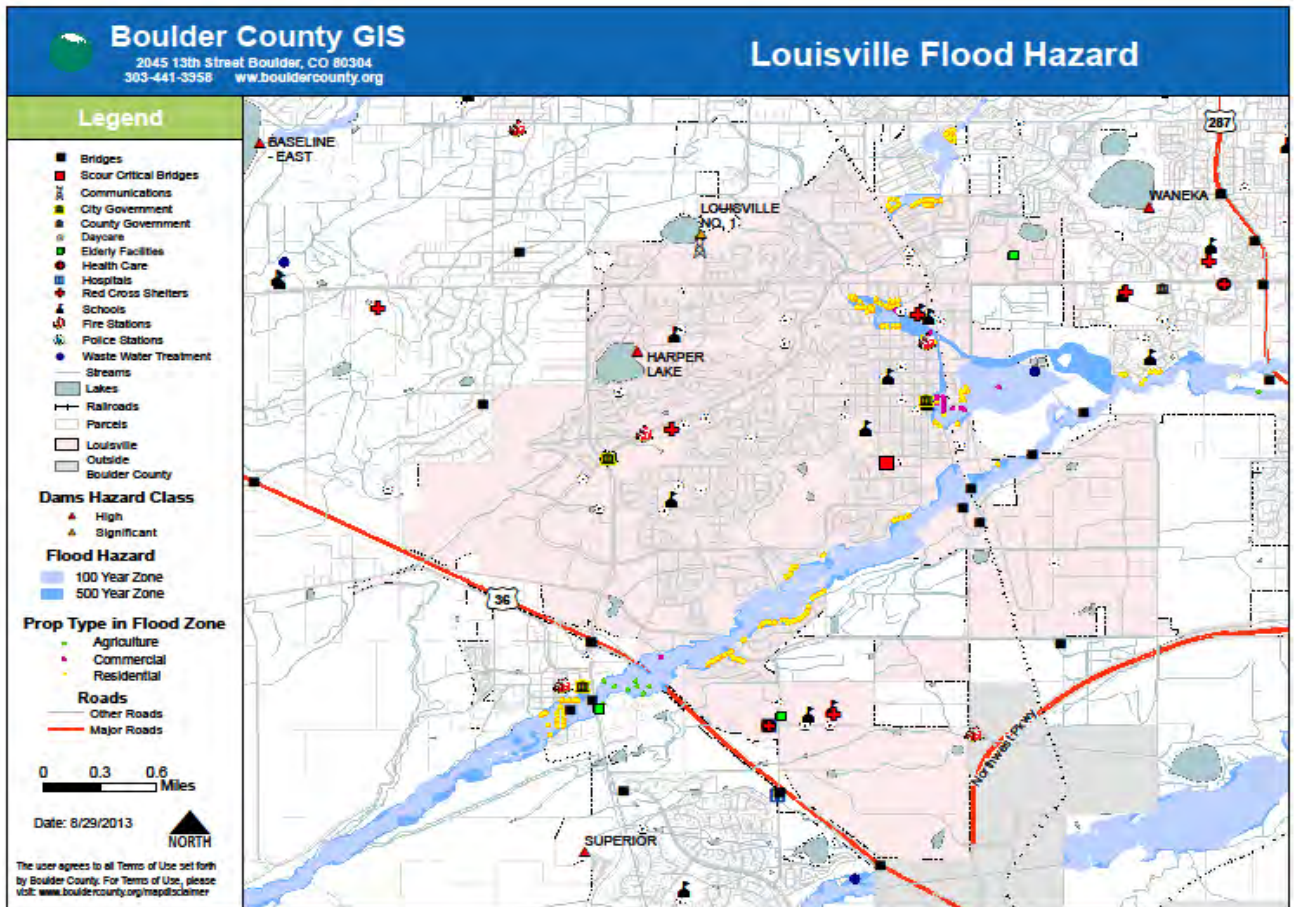
The City's Public Works Operations Division posts a snow removal map along with safety tips on their web site.

Table F 5.2.1. Louisville's Property and Values in 100- and 500-Year Flood Zones

Louisville's Property and Values in 100- and 500-Year Flood Zones

Property Type	Improved Parcel Count	Improved Value (\$)	Contents Value (\$)	Total Value (\$)
100-Year Flood Zone				
Residential	80	\$19,533,000	\$9,766,500	\$29,299,500
Commercial	12	\$14,243,116	\$7,121,558	\$21,364,674
Exempt	3	\$1,948,500	\$974,250	\$2,922,750
Industrial	1	\$38,500	\$19,250	\$57,750
Agricultural	0	\$0	\$0	\$0
Total	96	\$35,763,116	\$17,881,558	\$53,644,674
Population estimate for residences:	191			
500-Year Flood Zone				
Residential	106	\$26,835,200	\$13,417,600	\$40,252,800
Commercial	4	\$2,345,153	\$1,172,577	\$3,517,730
Exempt	4	\$3,300,200	\$1,650,100	\$4,950,300
Industrial	0	\$0	\$0	\$0
Agricultural	0	\$0	\$0	\$0
Total	114	\$32,480,553	\$16,240,277	\$48,720,830
Population estimate for residences:	253			
Combined 100- and 500-Year Flood Zones				
Residential	186	\$46,368,200	\$23,184,100	\$69,552,300
Commercial	16	\$16,588,269	\$8,294,135	\$24,882,404
Exempt	7	\$5,248,700	\$2,624,350	\$7,873,050
Industrial	1	\$38,500	\$19,250	\$57,750
Agricultural	0	\$0	\$0	\$0
Total	210	\$68,243,669	\$34,121,835	\$102,365,504
Population estimate for residences:	445			

Figure F 5.2.2 Louisville Flood Hazard



Annex G: Lyons

G.1 Community Profile

Lyons is a small town (1.2 square miles) in north-central Colorado, just northwest of Boulder and 10 miles west of Longmont. The Town lies at the bottom of a “tea cup” valley at an elevation averaging 5,330 feet surrounded by steep, red sandstone mountains and is at the confluence of the South St. Vrain and the North St. Vrain river drainages on the east side of the Continental Divide. Lyons has mild climate. It is cool in the summer and fairly warm in the winter since it is located in a bowl surrounded by sandstone.

First settled in the 1880s, Lyons was established as a mining and agricultural center. In 1880, E.S. Lyon from Connecticut settled the area to improve his health. His 160 acres contained durable salmon-red sandstone, which was much in demand for building at the time. He returned east to sell shares, and soon after, the new quarry town was plotted (although not incorporated until 1891).

Within three years of its founding, Lyons had a narrow gauge railroad, extended by the Denver, Utah, and Pacific Railroad to haul out sandstone. The scale of quarrying expanded that same year, and the Union Pacific was persuaded to extend a standard gauge to Lyons and stone was then shipped to Omaha as well as to Denver.

During this period, about 1,000 tons per day were quarried in Lyons. Around 1906, cement began to replace stone in building, and employment opportunities in the Town dwindled. Growth in Boulder County in the 1960s brought new residents to the Town in the form of commuters to Longmont and Boulder. Today some quarrying continues, although the railroad spurs have been removed.

G.1.1 Population

The estimated 2006 population of the Town of Lyons was 1,747. Select Census 2000 demographic and social characteristics for Lyons are shown in Table G.1.

Table G.1. Lyons' Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	50.3
Female (%)	49.7
Under 5 Years (%)	5.6
65 Years and Over (%)	6.1
Race/Ethnicity (one race)	
White (%)	92.5
Hispanic or Latino (Of Any Race) (%)	8.0
Other	
Average Household Size	2.36
High School Graduate or Higher (%)	90.7

Source: U.S. Census Bureau, 2000, www.census.gov/

G.1.2 Economy

The Town of Lyons has a limited economic base to support its residents. There is no single large employer or industry. Lyons is primarily a bedroom community. Most residents commute to the larger communities nearby for their employment. Farming and ranching still play a large role in the local economy. The businesses that are in Town are generally small local businesses, predominantly specialty retail and personal services stores and eating and drinking establishments that derive the greatest portion of their business from visitors. There are basic retail and personal services for local residents including a grocery store, doctor's office, bank, and other community serving businesses.

According to the 2000 Census, the industries that employed most of Lyons' labor force were educational, health and social services (17.5%); construction (14.5%); professional, scientific, management, administrative, and waste management services (13.4%); manufacturing (11.9%); and arts, entertainment, recreation, accommodation and food services (11.5%). Select economic characteristics for Lyons from the 2000 Census are shown in Table G.2.

Table G.2. Lyons' Economic Characteristics

Characteristic	
Families below Poverty Level, 1999	28
Individuals below Poverty Level, 1999	129
Median Home Value	\$199,100
Median Household Income, 1999	\$50,764
Per Capita Income, 1999	\$28,276
Population in Labor Force	898

Source: U.S. Census Bureau (2000), www.census.gov/

G.2 Hazard Summary

The hazards of most concern for Lyons includes dam failure, flood, severe winter storms, windstorms and wildfire. Hillside development on steep slopes and ridgelines has been a major concern for reasons that include drainage impacts on downstream properties. There are also traffic concerns associated with single access points through existing neighborhoods on inadequately designed roads.

With records dating back to 1894, Lyons has had some type of significant flood or fire event occur every decade. The worst in terms of flood was in 1941 and 1969. The most recent nearby wild land fires burning over 1000 acres each and causing millions of dollars of damage have occurred in 1988, 1989, 1990, 2000, and 2003. The historical town and surrounding local area has had damage or destruction to roads, bridges, homes, business, railroads, farmland and streams. Localized nuisance flooding and small wild land fires occurs almost every year.

G.3 Asset Inventory

G.3.1 Property Inventory

Table G.3 represents an inventory of property in Lyons based on the Boulder County Assessor's data as of March 12, 2008.

Table G.3. Lyons' Property Inventory

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	723	81,212,300	715	167,629,500	248,841,800
Commercial	35	3,554,300	35	7,260,800	10,815,100
Exempt	47	5,927,000	10	3,576,400	9,503,400
Industrial	3	245,600	3	363,800	609,400
Vacant	105	9,199,100	0	0	9,199,100
State Assessed	2	0	0	0	0
Unknown	2	0	0	0	0
Total	917	100,138,300	763	178,830,500	278,968,800

Source: Boulder County Assessor's Office

G.3.2 Other Assets

Table G.4 is a detailed inventory of assets identified by the Town's planning team. This inventory includes critical facilities. For more information about how "critical facility" is defined in this plan, see Section 4.3 Vulnerability Assessment.

Table G.4. Lyons' Assets

Name of Asset	Type	Address	Replacement Value (\$)	Displacement Cost (\$)	Occupancy/ Capacity #	Hazard Specific Info
United Medical Center of Lyons, Doctors offices	Essential		852,000		100	Dam failure
Lyons Town hall / sheriffs substation	Essential		1,000,000	\$3,060/day	20	100 yr flood / fire
Public Works building, 5 th Ave	High potential loss		500,000	\$1,497/day	10	100 yr flood fire
Waste water plant Sewer treatment	Essential		8,000,000	\$2,563/day	2	100 yr flood
Post Office Bldg, town owned	High potential loss		1,000,000	Loss of lease payment of \$268/day		100 yr flood fire
Walt Self Senior Housing	High potential loss		1,250,000		40	Dam failure fire
Fire Station	Essential		800,000		40	Dam failure
Public Works buildings 2 nd Ave	High potential loss		500,000	\$175/day	10	100 yr flood fire
Hwy 36 Bridge at Apple Valley	Transportation and lifeline		CDOT 10-15 million			flood
Hwy 36 Bridge at 5 th Ave	Transportation and lifeline		CDOT 10-15 million			flood
Hwy 7 Bridge at 5 th Ave	Transportation and lifeline		CDOT 10-15 million			flood
McConnell St Bridge	Transportation and lifeline		1,600,000			flood
Highway 36 in Lyons Town limits	Transportation and lifeline		25-35 million			flood
City water mains flow under the N St Vrain river 3x Sewer and water lines	Essential		7 miles of infrastructure at 130 per lin ft; 4,805,000	3,000/day		100 yr flood
Meadow Park facilities	Economic		450,000	569/day	500	flood
Bohn Park Facilities	Economic		550,000	380/day	500	flood
Historic landmark 500 W Main and Planet Bluegrass Festival site	Historical asset		1,200,000		4,000 during an event, it is in the flood way	flood
High school	High potential loss		20,500,000		500	Dam failure
Library and historical	Historical		750,000	364/day	50	

Name of Asset	Type	Address	Replacement Value (\$)	Displacement Cost (\$)	Occupancy/ Capacity #	Hazard Specific Info
landmark						
Sandstone Park, visitor center and facilities	Economic		250,000	380/day		
Corridor Trail	Economic		150,000			
Water service high pump station	Transportation and lifeline		1,200,000	2,700/day		
Sewer lift stations	Transportation and lifeline		125,000	1,200/day		
Whitewater kayak park	Economic		175,000	380/day		
Town street paving	Transportation and lifeline		110/sq yard			

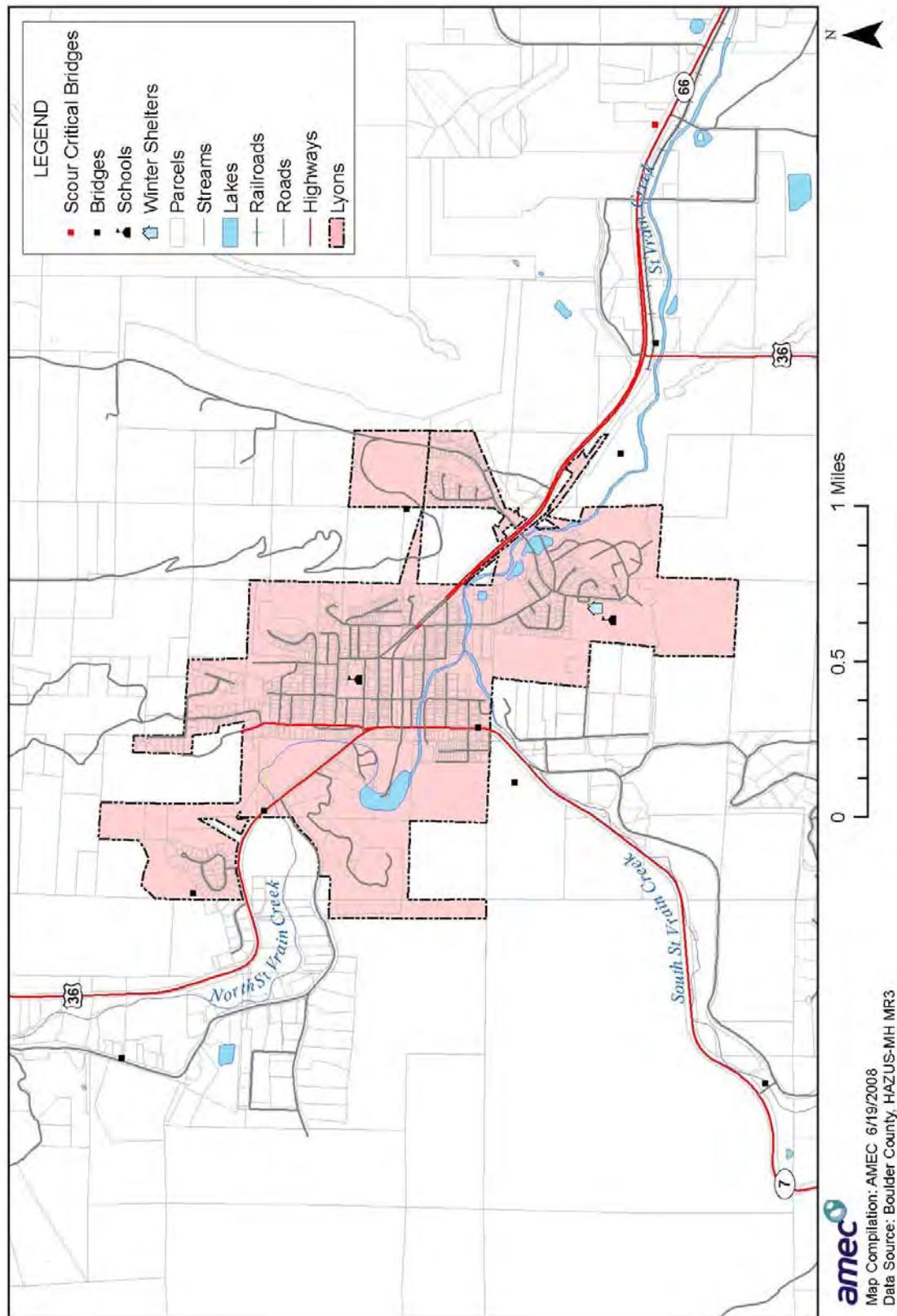
Some of the facilities listed above are also in GIS databases provided by Boulder County. Critical facility counts and types are shown in Table G.5 and in the map in Figure G.1. Shelters may be in facilities such as schools or recreation centers and are not indicated on the map.

Table G.5. Summary of Lyons' Critical Facilities in GIS

Critical Facility Type	Facility Count
Bridges	3
Schools	2
Shelters	1
Winter Shelters	1
Total	7

Source: Boulder County

Figure G.1. Lyons' Base Map and Critical Facilities



G.3.3 Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major employers are unable to return to normal operations, impacts ripple throughout the community.

According to the 2007 Lyons Community Profile from the Denver Regional Council of Governments, the following are Lyons' major employers:

St. Vrain Valley School District
U.S. Postal Service
Falkenstein Company
Telluride Bluegrass Festival Inc.
Swiss Bavarian Inc.
Ms. Mindys Cafe Llc
Frakes Inc.
First National Bank of Brighton
Lionscrest Manor Inc.
England Surveying Inc.

G.3.4 Natural, Historic, and Cultural Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

For information about natural resources in Boulder County, which includes Lyons, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

Table G.6 lists the properties in Lyons that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties (for more information about these registers, see Section 4.3 Vulnerability Assessment). Those properties that are only on the Colorado State Register are indicated with an asterisk.

Table G.6. Lyons' Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
First Congregational Church of Lyons	High and 4 th Streets	12/12/1976
Longmont Power Plant	Old Apple Valley Road	9/10/1987
Lyons Railroad Depot	400 block of Broadway	12/2/1974
Lyons Sandstone Buildings (Lyons Historic District)	U.S. 36 and CO 7	4/29/1980
Meadow Park Shelter House*	600 Park Drive	3/10/1993
North St. Vrain Creek Bridge	CO 7 at milepost 32.98	10/15/2002

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/; National Register Information System, www.nr.nps.gov/

*Only on the Colorado State Register of Historic Properties

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

G.4 Growth and Development Trends

Table G.7 illustrates how Lyons has grown in terms of population and number of housing units between 2000 and 2006.

Table G.7. Lyons' Change in Population and Housing Units, 2000-2006

2000 Population	2006 Population Estimate	Estimated Percent Change 2000-2006	2000 # of Housing Units	2006 Estimated # of Housing Units	Estimated Percent Change 2000-2006
1,585	1,747	+10.22	686	788	+14.87

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/

The Town of Lyons is approaching build out for residential homes and this should occur in a few years.

Development along the St. Vrain River is a concern with respect to flood safety issues. Some of the new construction areas are in the 100-year flood area and certainly in an area that would be at risk should there be a dam failure.

G.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes Lyons' regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

G.5.1 Mitigation Capabilities Summary

Table G.8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Lyons.

Table G.8. Lyons' Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Town of Lyons Comprehensive Plan, 1998 (plans to amend in 2008)
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Growth management ordinance	Yes	Controlled with water tap sales for new home construction and sales
Floodplain ordinance	Yes	
Site plan review requirements	Yes	SAFEbuilt Colorado
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Stormwater, steep slope
Building code	Yes	2003 International Building Code
BCEGS Rating	Yes	SAFEbuilt Colorado
Fire department ISO rating	Yes	Lyons Fire Protection District Rating: 6
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Capital improvements plan	Yes	
Economic development plan	Yes	Downtown Improvement Plan
Local emergency operations plan	Yes	Emergency Operations Plan Boulder County-City of Boulder
Other special plans	Yes	Boulder County OEM, Storm Drainage Master Plan, 1997; Lyons Flood Hazard Mitigation Plan, 1994
Flood insurance study or other engineering study for streams	Yes	FEMA Flood Insurance Study, October 4, 2002; Letter of Map revision
Elevation certificates	Yes	Required before and after construction

Table G.9 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Lyons.

Table G.9. Lyons' Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Consultant hired as needed, Jim Blankenship and Rosi Koopmann	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Consultant hired as needed Jim Blankenship and Rosi Koopmann	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Consultant hired as needed Jim Blankenship and Rosi Koopmann	
Personnel skilled in GIS	Yes	Boulder County GIS Coordinator	
Full-time building official	Yes	Consultant hired as needed, Barry Kramer, SAFEbuilt Colorado	
Floodplain manager	Yes	Town Administrator Howard Armstrong	
Emergency manager	Yes	Sgt. Kevin Parker, Boulder County Sheriff's Office	
Grant writer	Yes	Town Administrator Howard Armstrong	
GIS Data – Hazard areas	Yes	Boulder County GIS Coordinator	
GIS Data – Critical facilities	Yes	Boulder County GIS Coordinator	
GIS Data – Building footprints	Yes	Boulder County GIS Coordinator	
GIS Data – Land use	Yes	Boulder County GIS Coordinator	
GIS Data – Links to assessor's data	Yes	Boulder County GIS Coordinator	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Contract with Boulder Regional Communications Center, Boulder County Sheriff's Office	Reverse 9-11, outdoor sirens
Other	Yes	Jacque Watson, Town of Lyons	

Table G.10 identifies financial tools or resources that Lyons could potentially use to help fund mitigation activities.

Table G.10. Lyons' Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Grant cycle and availability of funds
Capital improvements project funding	Yes	Limited resources
Authority to levy taxes for specific purposes	Yes	With voter approval
Fees for water, sewer, gas, or electric services	Yes	By ordinance
Impact fees for new development	Yes	By ordinance
Incur debt through general obligation bonds	Yes	With voter approval
Incur debt through special tax bonds	Yes	With voter approval
Incur debt through private activities	Yes	With Town Board approval
Withhold spending in hazard-prone areas	Yes	

G.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The Town of Lyons joined the National Flood Insurance Program (NFIP) on August 1, 1980. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds.

NFIP insurance data indicates that as of February 29, 2008, there were 75 policies in force in Lyons, resulting in \$14,393,600 of insurance in force. Of these, 73 were for residential properties (all but 4 were single-family homes), and 58 were in A zones (special flood hazard areas).

In Lyons, there have been five historical claims for flood losses totaling \$6,793. All of the losses were to single-family homes. Four of the losses were associated with pre-FIRM structures in an A zone (data was not available on the fifth loss). There were no repetitive or severe repetitive losses.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Lyons activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

Town of Lyons Comprehensive Plan, 1998

The Town of Lyons Comprehensive Plan presents the community's vision for the future development of Lyons and the Town's surrounding areas. The plan provides goals and objectives for the key elements of this vision along with specific actions for implementation. Recommendations are made for policies related to growth and development; housing; business development; transportation; the natural environment; parks, recreation, and culture; and public utilities and services.

The following goals and related objectives are most relevant to hazard mitigation.

Goal: Insure orderly growth and high quality development.

- Establish appropriate development densities and intensities for new development areas consistent with the surrounding character of development; natural features and systems; and the ability to provide safe, efficient and adequate transportation and utilities infrastructure.
- Insure the Town's land use and development regulations (including annexation, zoning, and subdivision) adequately protect the public's health, safety, and welfare and achieve the community's desired standards for development.

Goal: Encourage development to be harmonious with the natural environment.

- Prevent any development that adversely impacts the environment.
- Require development locations, site planning, and site design to preserve prominent natural features and natural systems, such as ridgelines, steep hillsides, natural drainages, wetlands, riparian areas, and scenic areas.

Goal: Preserve and protect valued natural features and resources, and their natural functions.

- Protect natural drainageways for efficient conveyance of stormwater and preservation of ecological systems.
- Protect floodplain areas from development to safeguard life and property from flooding.
- Protect riparian areas and all wetlands as vital components of the community's ecosystems.
- Preserve wildlife habitat areas and migration corridors.
- Preserve and protect geologic hazard areas and sensitive soils.
- Protect water sources.
- Harmonize new development with the carrying capacity of the land.

Lyons Municipal Code

Title 8 Building Regulations (Includes Flood-Proofing, Flood Damage Prevention Regulations)

The purpose of Lyons' flood-proofing regulations is to provide uniform regulations and establish special flood-proofing requirements and minimum standards of design and construction for building and structures susceptible to flood damage.

It is the purpose of the flood damage prevention regulations to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

Protect human life and health;

Minimize expenditure of public money for costly flood control projects;

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

Minimize prolonged business interruptions;

Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard;

Help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood bright areas;

Insure that potential buyers are notified that property is in an area of special flood hazard; and

Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, the regulations include methods and provisions for:

Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

Controlling filling, grading, dredging, and other development which may increase flood damage; and

Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Specifically, the regulations require a development permit for construction of development in any area of special flood hazard, outline the duties and responsibilities of the zoning and building inspector in administering the regulations, and set standards for flood hazard reduction, including anchoring, construction materials and methods, design and location of utilities, subdivision proposals, elevation

(base flood elevation), floodproofing, and mobile homes. Additional provisions more stringently limit development in floodways.

Other Regulations

Title 6 Public Ways and Property—This title includes a chapter designed to promote and protect the public health, safety, and general welfare by providing for the regulation of the planting, maintenance, and removal of trees, shrubs, bushes, and other woody vegetation within the Town.

Title 7 Public Utilities—Among this title’s regulations are outdoor watering, sprinkling, and irrigation restrictions that authorize emergency regulations and limit residential sprinkling and irrigation.

Title 9 Zoning Regulations—These regulations were designed to secure safety from fire, panic, and other dangers; to promote the public health and general welfare; to prevent overcrowding of land; to avoid undue concentration of population; and to facilitate the adequate provision of public services (among other things). Hill side requirements limit development of slopes in excess of 10 percent to planned unit developments that provide for protection against rockfalls, unstable slopes, landslides, soil erosion, runoff, and preservation of scenic natural areas.

Title 10—Subdivision Regulations—These regulations are designed to promote and protect the public health, safety, and general welfare and to provide for orderly growth and harmonious, efficient development. Their mitigation-related purposes include the following:

- Establish minimum uniform standards for subdivision design, including planning and engineering criteria, environmental factors, performance guarantees, and planned unit development requirements.
- Assure the planning for and provision of public services.
- Secure adequate sites for open space.
- Preserve natural vegetation and cover.
- Prevent ponding or erosion from surface and subsurface runoff.
- Regulate development in areas of geological and topographical hazards, including, but not limited to, floodplains, areas of unstable or expansive soils, excessive slopes or slope areas, or areas poorly suited for building or construction.
- Protect against the loss or injury from inappropriate use of the land.

Design standards and criteria address drainage easements, steep slope protection, and wetlands and riparian areas. Public improvements and construction standards regulate construction of public improvements (facilities) in subdivisions, including bridges, culverts, drainage channels, and other infrastructure required to span water bodies, watercourses, irrigation ditches and natural or manmade drainage area; storm drainage improvements and storm sewers; and fire hydrants. They also require public improvements such as water, sanitary sewer, storm sewer, telephone, electric, natural gas, and other similar utility lines to be placed underground.

Other

The Lyons Flood Hazard Mitigation Plan (1994) was produced to record and evaluate the events of the August 1994 flood. It was structured to create a general awareness of the hazards associated with living in a floodplain and provide prevention tactics, mitigation practices, and ideas to lessen flood risk and vulnerability.

The Town has a storm drainage master plan (1997) that provides recommendations for a system of public improvements and developer requirements for detaining and conveying stormwater.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No current projects/activities.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

No current projects/activities.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

The volunteer-based Lyons Fire District provides fire safety and protection services to the Town. The Town has budgeted for and is in the process of having a new emergency siren installed. The siren will be remotely activated from the Boulder Regional Communication Center.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

No current projects/activities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

The Town has distributed emergency preparedness brochures in the utility billing.

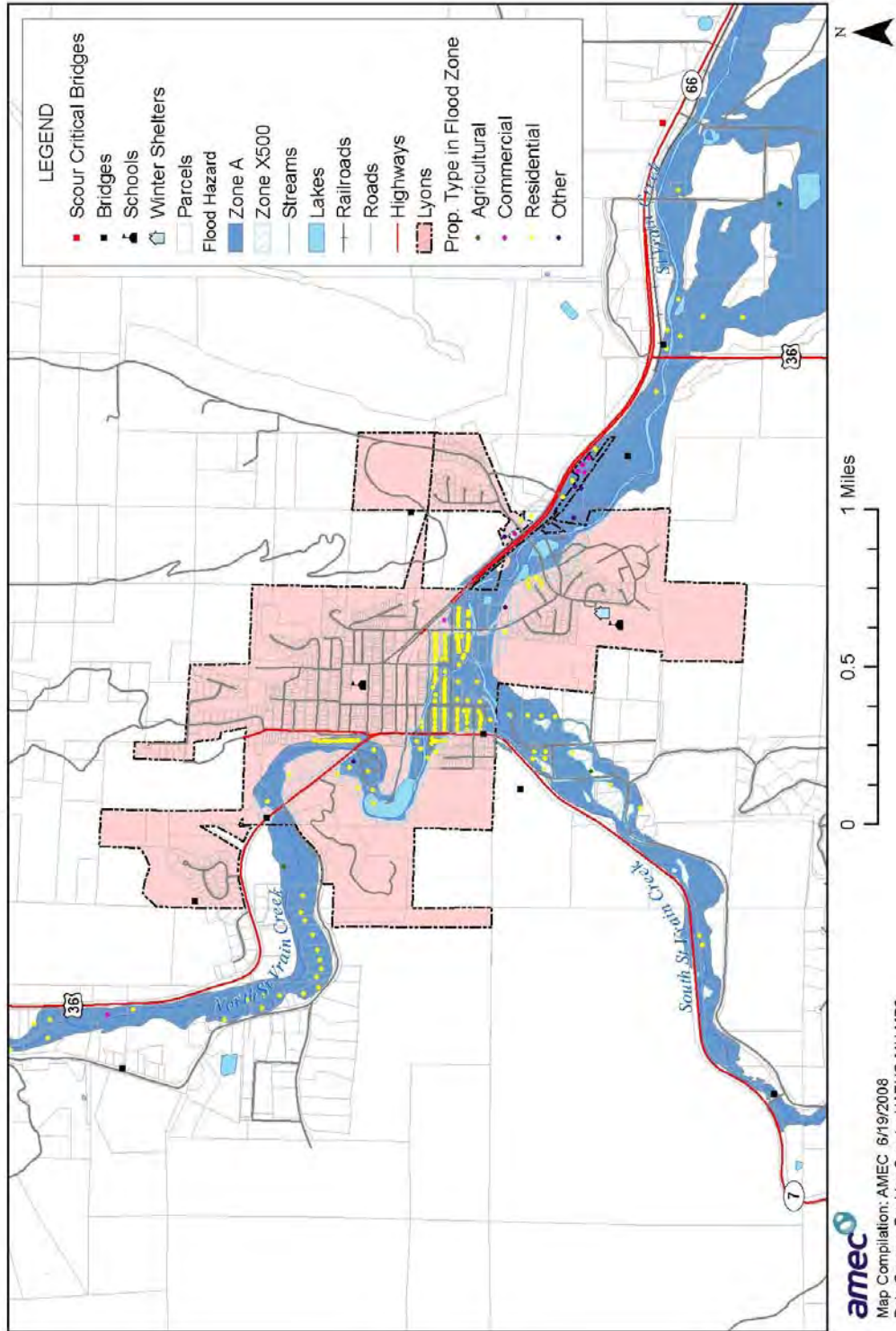
The Town has published newspaper articles on emergency issues such as flood in flood season and wildfire during fire season.

The Town has staffed emergency preparedness educational booths at town festivals.

Table G 5.2.1 Lyons' Property and Values in 100- and 500-Year Flood Zones

Lyons' Property and Values in 100- and 500-Year Flood Zones				
Property Type	Improved Parcel Count	Improved Value (\$)	Contents Value (\$)	Total Value (\$)
100-Year Flood Zone				
Residential	143	\$22,149,113	\$11,074,557	\$33,223,670
Commercial	1	\$41,400	\$20,700	\$62,100
Exempt	3	\$1,564,500	\$782,250	\$2,346,750
Industrial	1	\$114,300	\$57,150	\$171,450
Agricultural	0	\$0	\$0	\$0
Total	148	\$23,869,313	\$11,934,657	\$35,803,970
Population estimate for residences:	342			
500-Year Flood Zone				
Residential	36	\$9,592,200	\$4,796,100	\$14,388,300
Commercial	5	\$1,867,800	\$933,900	\$2,801,700
Exempt	2	\$286,827	\$143,414	\$430,241
Industrial	0	\$0	\$0	\$0
Agricultural	0	\$0	\$0	\$0
Total	43	\$11,746,827	\$5,873,414	\$17,620,241
Population estimate for residences:	86			
Combined 100- and 500-Year Flood Zones				
Residential	179	\$31,741,313	\$15,870,657	\$47,611,970
Commercial	6	\$1,909,200	\$954,600	\$2,863,800
Exempt	5	\$1,851,327	\$925,664	\$2,776,991
Industrial	1	\$114,300	\$57,150	\$171,450
Agricultural	0	\$0	\$0	\$0
Total	191	\$35,616,140	\$17,808,070	\$53,424,210
Population estimate for residences:	428			

Figure G 5.2.2 Lyons Flood Hazard



77	Responsible Office	Achieved	In progress	Date	Priority Then	Priority Now
City of Lyons						
Develop community wildfire protection plan for Lyons	Lyons Fire Protection District	Y / N	Y / N		High	High
Continue to implement sound floodplain management practices as communities participating in the NFIP	Lyons Admin Building Dept	Y / N	Y / N		High	High
Develop flood protection for the Lyons wastewater treatment plan	Lyons Public Works	Y / N	Y / N	01/01/2015	Mitigation in Process	High
Improve storm drain conveyance in Lyons	Lyons Public Works	Y / N	Y / N		Medium	Medium/High
Develop water system loop and install additional fire hydrants in Lyons	Lyons Public Works	Y / N	Y / N		Medium	Medium

Annex H: Superior

H.1 Community Profile

The Town of Superior in southeast Boulder County is bounded by the Rocky Flats Environmental Technology Site and State Highway 128 to the south, the City of Boulder and County Open Space to the west and northwest, U.S. 36 to the east and northeast, and the City and County of Broomfield and Jefferson County to the southeast. The total planning area, including the existing town limits and potential annexation areas, is approximately 4.26 square miles.

The elevation of Superior ranges from 5,475 feet along Coal Creek in “Original” Superior to 5,980 feet on the ridge paralleling State Highway 128. Rock Creek and Coal Creek are the major drainage basins that flow through the Town. Both converge with Boulder Creek and eventually St. Vrain Creek, a major tributary to the South Platte River.

The climate is semi-arid, with an average of 18 inches of precipitation per year. Temperatures range from -22°F. to 104°F.

The Town of Superior was founded in 1896 by William C. Hake and incorporated in 1904. At that time, the Town’s economy was based largely on farming and coal mining in the surrounding foothills. The shaft to the Industrial Coal Mine was sunk in 1896 on the hillside immediately to the south of the present location of Original Superior. The coal was said to be of “Superior” quality, and so the Town was named.

Mining was the major force in Superior’s history until 1945 when, similar to other mines located throughout southeast Boulder County, the removal of coal from the Industrial Mine became uneconomical, and the mine was closed. Commercial development that supported the mining industry also came to a halt, and the Town evolved into a quiet ranching and farming community. In the 1990s, the economic and new construction boom made Superior one of the fastest growing communities in the nation.

H.1.2 Population

The estimated 2006 population of the Town of Superior was 10,173. Select Census 2000 demographic and social characteristics for Superior are shown in Table H.1.

Table H.1. Superior's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	51.5
Female (%)	48.5
Under 5 Years (%)	9.3
65 Years and Over (%)	1.5
Race/Ethnicity (one race)	
White (%)	86.8
Hispanic or Latino (Of Any Race) (%)	4.9
Other	
Average Household Size	2.67
High School Graduate or Higher (%)	99.2

Source: U.S. Census Bureau, 2000, www.census.gov/

H.1.3 Economy

The Town of Superior is a bedroom community to the Denver-Boulder metropolitan region and offers limited opportunities for residents to work within the Town boundaries. According to the 2000 Census, the industries that employed most of Superior's labor force were professional, scientific, management, administrative and waste management services (20.7%); Manufacturing (17.5%); and educational, health and social services (17.1%). Select economic characteristics for Superior from the 2000 Census are shown in Table H.2.

Table H.2. Superior's Economic Characteristics

Characteristic	
Families below Poverty Level, 1999	58
Individuals below Poverty Level, 1999	343
Median Home Value	282,400
Median Household Income, 1999	82,079
Per Capita Income, 1999	36,326
Population in Labor Force	5,341

Source: U.S. Census Bureau (2000), www.census.gov/

H.2 Hazard Identification and Summary

The most significant hazards for Superior are floods, expansive soils, land subsidence, severe winter storm and wildfire. Refer to Section 4.3 Vulnerability Assessment for detailed vulnerability to the flood hazard. Due to the historical coal mining in the area subsidence of the land surface is a concern in Superior. Other hazards that could impact Superior include dam failure, drought, hailstorm, earthquake, extreme heat, lightning, tornado, windstorm, West Nile Virus and Pandemic Flu.

Coal Creek runs through Original Superior and has occasionally caused flood damage in the Town's history. Notably, flooding occurred in the Spring of 1935 and resulted in damage to the 3rd Avenue

bridge, leaving the 2nd Avenue bridge as the only means for vehicular access to a segment of this neighborhood. In 1995, flooding caused damage to the structural buttress of the 2nd Avenue bridge. Currently, access to existing residential development south of Coal Creek is limited to the 2nd Avenue bridge.

H.3 Asset Inventory

H.3.1 Property Inventory

Table H.3 represents an inventory of property in Superior based on the Boulder County Assessor's data as of March 12, 2008. No other assets, such as critical facilities, were identified by the City during the planning process.

Table H.3. Superior's Property Inventory

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	3,482	421,371,000	3,473	1,032,857,300	1,454,228,300
Commercial	30	38,360,800	26	80,104,100	118,464,900
Exempt	124	21,813,800	11	11,141,000	32,954,800
Agricultural	5	15,400	0	0	15,400
Minerals	25	14,800	0	0	14,800
State Assessed	3	0	0	0	0
Vacant	135	15,512,600	0	0	15,512,600
Unknown	2	0	0	0	0
Total	3,806	497,088,400	3,510	1,124,102,400	1,621,190,800

Source: Boulder County Assessor's Office

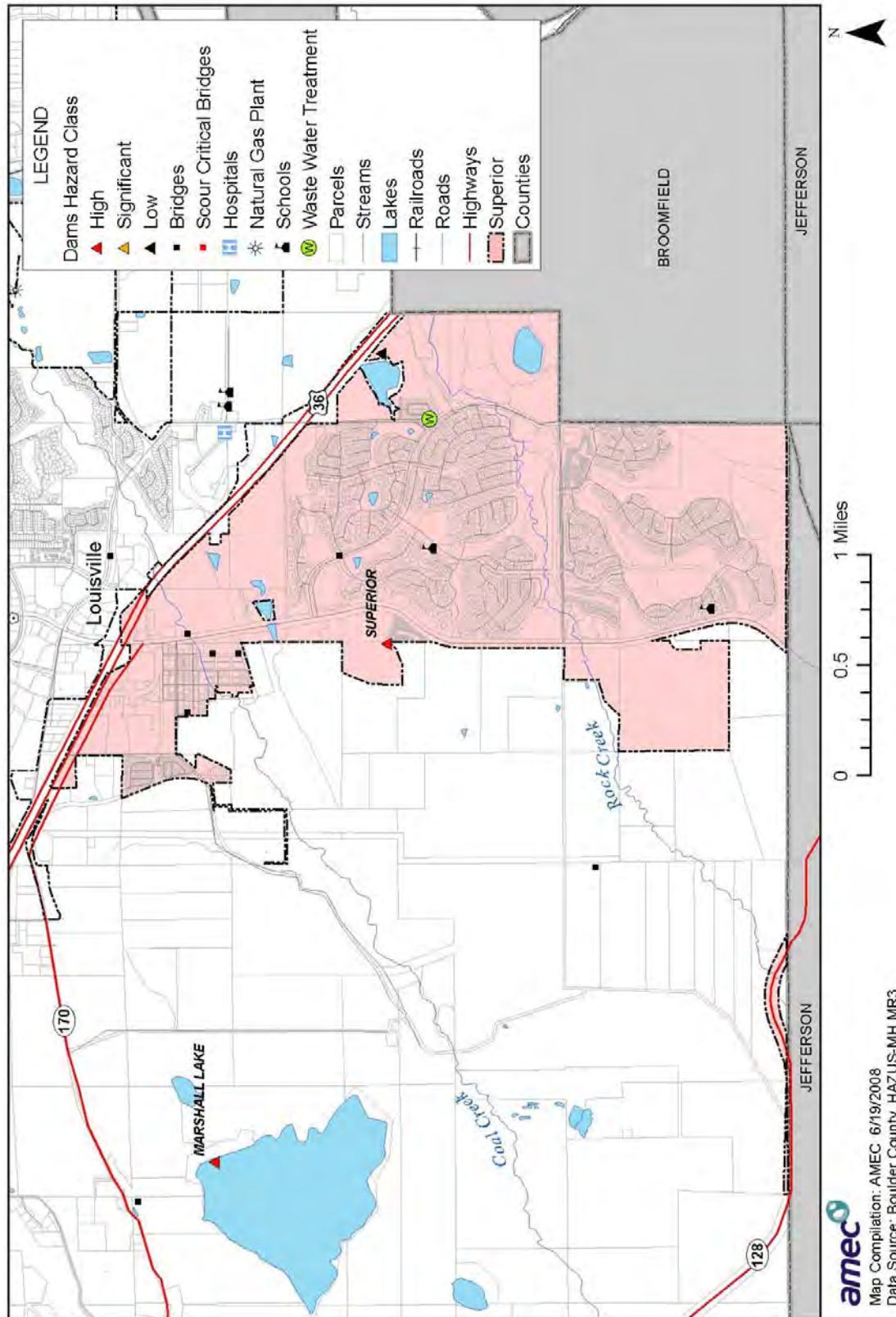
Critical facility counts and types in GIS databases provided by Boulder County are shown in Table H.4 and in the map in Figure H.1.

Table H.4. Summary of Superior's Critical Facilities in GIS

Critical Facility Type	Facility Count
Bridges	6
Dams	2
Schools	2
Waste Water Treatment	1
Total	11

Source: Boulder County

Figure H.1. Superior's Base Map and Critical Facilities



H.3.3 Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major employers are unable to return to normal operations, impacts ripple throughout the community.

According to the 2007 Superior Community Profile from the Denver Regional Council of Governments, the following are Superior's major employers:

Manpower International, Inc.
Price Company Inc.
Target Corporation
Boulder Valley School District
Amn Services Inc.
Wal Mart Stores Inc.
Flatirons Behavioral Health Corporation
Safeway Stores Inc.
Wild Oats Markets Inc.
Trinet Employer Group Inc.

H.3.4 Natural, Historic, and Cultural Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher. The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

The Town contains a variety of wildlife because of its location between the foothills and the plains. It likely receives infrequent visits from species inhabiting plains, foothill, montane, and aquatic/riparian

habitats. The Town is the edge of geographical range for numerous species. The abundance of wildlife species varies widely within and across habitats and cannot be obtained without detailed population studies.

For information about natural resources in Boulder County, which includes Superior, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

The Coal Creek Agricultural Site (Grasso Park) at 122 E. William Street was listed on the Colorado State Register of Historic Properties (for more information about this register, see Section 4.3 Vulnerability Assessment) on March 11, 1998.

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

H.4 Growth and Development Trends

Table H.5 illustrates how Superior has grown in terms of population and number of housing units between 2000 and 2006.

Table H.5. Superior's Change in Population and Housing Units, 2000-2006

2000 Population	2006 Population Estimate	Estimated Percent Change 2000-2006	2000 # of Housing Units	2006 Estimated # of Housing Units	Estimated Percent Change 2000-2006
9,008	10,173	+12.93	3,753	4,441	+18.33

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/

Until 1986, Superior was confined to a small area of residential development flanking Coal Creek and included limited commercial activity. In 1987, the Rock Creek Planned-Unit Development was submitted to the Town, and the residents voted to annex Rock Creek Ranch in exchange for improved services and utilities. The first building permit was issued in 1990. Development along the U.S. 36 corridor and increasing growth and development in the Denver/Boulder metropolitan area has resulted in an increase in residential and commercial development in the communities adjacent to the Town. In addition, growth caps imposed by the City of Boulder prompted increased development in surrounding communities.

The Town of Superior contains undeveloped parcels adjacent to the U.S. 36 corridor that have attracted the attention of the development community. To the west of Superior, the landscape between Boulder

and Superior has remained relatively unchanged due to the acquisition of large tracts of open space by Boulder County and the City of Boulder.

H.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes Superior's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

H.5.1 Mitigation Capabilities Summary

Table H.6 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Superior.

Table H.6. Superior's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Town of Superior 2001 Comprehensive Plan with 2006 Amendment
Zoning ordinance	Yes	Land Use Code Chapter 16
Subdivision ordinance	Yes	Land Use Code Chapter 16
Growth management ordinance	No	
Floodplain ordinance	Yes	Land Use Code Chapter 16
Site plan review requirements	Yes	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Drainage, Storm Water Management, Erosion Control (Land Use Code Chapter 16, Article XXXIX)
BCEGS Rating	No	
Building code	Yes	2006 International Building Code
Fire department ISO rating	Yes	Rating: 3
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Capital improvements plan	Yes	2008 Town of Superior Budget
Economic development plan	No	
Local emergency operations plan	No	Included in Boulder County's Emergency Operations Plan
Other special plans	Yes	Coal Creek Master Drainage Plan, 2001; Parks, Recreation, Open Space, and Trails Master Plan, 2005
Flood insurance study or other engineering study for streams	Yes	FEMA Flood Insurance Study, October 4, 2002; Coal Creek Drainage Way Planning Study
Elevation certificates	No	

Table H.8 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Superior.

Table H.7. Superior’s Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Administration Department, Assistant Town Manager	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Public Works and Utilities Department, Director	
Planner/engineer/scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		Red Oak Consulting
Full-time building official	Yes		RG Engineering
Floodplain manager	Yes		Building Inspector
Emergency manager	No		Boulder County
Grant writer	No		
Other personnel	No		
GIS Data – Hazard areas	No		
GIS Data – Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		Red Oak Consulting
GIS Data – Links to assessor’s data	No		Red Oak Consulting
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	No		Reverse 9-11, Boulder County

Table H.8 identifies financial tools or resources that Superior could potentially use to help fund mitigation activities.

Table H.8. Superior’s Fiscal Mitigation Capabilities

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

H.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The Town of Superior joined the National Flood Insurance Program (NFIP) on September 28, 1979. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds.

NFIP insurance data indicates that as of February 29, 2008, there were five policies in force in Superior, resulting in \$784,100 of insurance in force. All were for residential properties (single-family homes), and two were in A zones (special flood hazard areas). In Superior, there have not been any historical claims for flood losses, thus there were no repetitive or severe repetitive losses.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Superior activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

Town of Superior 2001 Comprehensive Plan with 2006 Amendment

The purpose of this plan is to provide a basis for current and future land use decisions in the Town of Superior. This plan seeks to facilitate rational decisions regarding future development that are based on limited natural resources, economic considerations, and sound community design and planning principles. Plan goals and related policies particularly relevant to hazard mitigation include the following:

Goal: Protect and promote the health, safety, education, and welfare of residents and employees within the Town.

- Implement the Coal Creek Basin Master Drainage Plan as approved by the Board of Trustees.
- Invest in mapping pertinent land use information for the town, filling gaps where necessary. A Geographic Information System (GIS) should be implemented and is fundamental to support future land use decisions and general administration of the Town.
- Consider impact fees for future development that necessitates infrastructure improvements including, but not limited to, paved access, utilities and public services.
- Appoint a permanent Open Space, Parks, Trails, and Recreation Committee.

Goal: Ensure that a high quality, natural environment is preserved and integrated into future development. Promote and encourage the preservation of existing natural resources including vegetation, drainages, wetlands, ridgelines, steep slopes, wildlife habitat, and migration corridors.

- Prohibit development which could endanger public safety or property on or near areas determined to be geologically unstable. Subsidence reports certified by qualified professionals shall be required, prior to development in any areas known or suspected of being undermined, to prove the safety of these areas.
- Require future development to mitigate negative impacts on environmentally scarce and valuable lands.
- Develop floodplain management policies to preserve riparian habitat and wildlife migration corridors within the Town. Flood-prone areas of streams and rivers in the Town shall be designated as “floodplain management areas,” with special development standards applied therein.
- Coordinate with Boulder County and appropriate regional, state, and federal agencies in flood control, water quality, and stormwater and irrigation run-off programs to realize the greatest benefit from all of these programs.
- Protect natural features and habitat associated with drainage corridors.
- Amend the Town’s Land Use Code to specify that any proposed subdivision that adversely affects drainages and existing tree stands may be denied.
- Encourage new development to employ water conservation techniques to the greatest extent possible.
- Require development submittals to indicate “Areas of Disturbance.” Require contractors to install construction fencing to minimize soil compaction and destruction of vegetation and erosion and to conform with grading permit standards.

Goal: Preserve those areas of existing open space that offer natural links between neighborhoods and community centers, that offer unique outdoor recreation and enjoyment, that provide important ecological functions, and that contribute to the community's aesthetic beauty in order to maintain an enjoyable and healthy community.

- Protect areas that provide significant habitat and/or important corridors between established habitat areas.
- Ensure that proposed development evaluates wildlife habitat impacts and reasonably mitigates any potential impacts when located near or within existing habitat areas.
- Protect, enhance, and develop the existing reservoirs and creek drainageways to protect wildlife habitat and to provide amenities for public use.
- Establish open space planning, acquisition, and maintenance as an integral part of the Town’s general planning, administrative, and budgeting processes.

Superior Municipal Code

Building Regulations (Including the Flood Control Plan)

Among the Building Regulations is the Town's Flood Control Plan. It is the purpose of these regulations to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions to specific areas by provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines and streets and bridges located in areas of special flood hazard;
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;
- Ensure that potential buyers are notified that property is in an area of special flood hazard; and
- Ensure that those who occupy the areas of special flood hazards assume responsibility for their actions.

In order to accomplish its purposes, the Flood Control Plan includes methods and provisions for:

- Restricting or prohibiting uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
- Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Controlling the alteration of natural floodplains, stream channels and natural protective barriers, which help accommodate or channel flood waters;
- Controlling filling, grading, dredging and other development which may increase flood damage; and
- Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Specifically, the regulations require a development permit for construction of development in any area of special flood hazard, outline the duties and responsibilities of the building inspector in administering the regulations, and set standards for flood hazard reduction, including anchoring, construction materials and methods, design and location of utilities, subdivision proposals, elevation (one-foot above base flood elevation), floodproofing, and mobile homes. Additional provisions more stringently limit development in floodways.

Land Use Code (Superior Development Code)

The Town's Land Use Code establishes the regulations and standards governing the use and development of land within the Town. Included are provisions for the annexation, subdivision, and zoning of land. Also included are the Town standards for the use of land. It is the intent of this code to ensure the orderly, efficient, and integrated development of the Town in a way that both promotes the health, safety, and general welfare of its residents and that is compatible and protective of the natural environment. Related to hazard mitigation, the Town seeks to:

Provide a high quality of life for its residents;

Maintain property values;

Provide for the adequate and concurrent provision of public infrastructure and services;

Ensure well-planned subdivisions by establishing adequate standards for design, improvements, and review;

Prevent loss of life and property from fire, flooding, geologic hazards, and other natural or manmade dangers; and

Conserve open space and significant environmental features.

Mitigation-specific regulations are described here:

The Zoning Regulations establish a few mitigation-related districts, which include the following:

- The Open Space and Recreation District was established as a conservation district to preserve the environment and natural character of the landscape within the district. Land within the district may be protected from development, but may also be used for trails, buffering between land uses, defining the edges of urbanization and the preservation of valuable natural features. In addition, this district is intended to provide open space areas for passive, active and developed recreation.
- The Open Space and Natural Uses District was established as a protection district to preserve the open space and undeveloped character of those properties within the district. Land within the district is protected from development but low-impact improvements to the land such as trails, trailheads, flood-control facilities, and reclamation may be allowed.
- The Overlay Environmental Constraints District was established to identify areas of natural or manmade hazards, such as steep slopes or ground subsidence, and wildlife potential or areas of unique environmental features or visual resources such as wildlife areas or ridgelines where additional study and design features are needed to mitigate the hazard or the visual effects of development.
- The Overlay Floodplain Management District was established to control development within the floodways and floodplains to minimize the threat to life and property and meet the requirements of the National Flood Insurance Program.

The Subdivision Regulations dictate that to be subdivided, land shall be of such character that it can be used safely for development purposes without unnecessary danger to health or peril of fire, flood, or other menace.

The Floodways and Floodplains Regulations prohibit artificial obstructions within floodways, identify permissible uses within floodways, and restrict construction within floodways and floodplains (also see discussion of Flood Control Plan above). They also require setbacks for development in areas located outside a designated floodplain but where a stream is located. The Drainage, Stormwater Management, and Erosion Control Regulations require that all development conform to the natural contours of the land, and natural and preexisting manmade drainage ways remain undisturbed (to the extent practicable); drain properly; plan for stormwater management; control sedimentation and erosion; The Steep Slope Areas Regulations restrict development on land which has slopes in excess of twenty percent (20 percent) shall be designated as steep slope areas. As such, these areas are susceptible to erosion, and development has the potential of creating unstable slope conditions that are hazardous to inhabitants and property. The Subsidence Hazard Areas Regulations restrict development in identified subsidence hazard areas.

Other

The Coal Creek Master Drainage Plan (2001) provides an overall concept and approach for landowners, developers, and the Town of Superior to plan the drainage facilities required for new development. The Town's consulting water engineers revised the existing conditions hydrologic model that can be used by developers and the Town to evaluate proposed drainage improvements.

The Town has a floodplain program to address safety concerns associated with homes and other structures currently located either partially or wholly within the Coal Creek floodplain, and to create additional open space parks and wildlife habitat along Coal Creek.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No current projects/activities.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

The purpose of the Town's Parks, Recreation, Open Space, and Trails Master Plan (2005) is to obtain community input and present information about existing levels of service for parks, recreation, natural open space, and trails in the Town and make recommendations for the future.

The Town's Open Space Summary Report (2005) reviews currently undeveloped properties in Superior and discusses their potential value to the Town as undeveloped open space. The Wildlife Survey and Habitat Evaluation for the Town of Superior, Colorado (2003), consists of a wildlife assessment and development of a GIS mapping of wildlife data on 18 privately owned properties. The goal of the project was to describe wildlife habitats, corridors, enhancement opportunities, and human interaction with wildlife on each of these properties to provide a basis for making acquisition recommendations, evaluating development proposals, and assisting in the development of an open space management plan.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

No current projects/activities.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

No current projects/activities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

Monthly articles and information on fire safety.

Monthly articles on environmental education as well as community events.

The Town has an ongoing water conservation campaign. Conservation tips are available on the Town's web site.

Table H 5.21. Superior's Property and Values in 100- and 500-Year Flood Zones

Superior's Property and Values in 100- and 500-Year Flood Zones				
Property Type	Improved Parcel Count	Improved Value (\$)	Contents Value (\$)	Total Value (\$)
100-Year Flood Zone				
Residential	12	\$1,344,958	\$672,479	\$2,017,437
Commercial	0	\$0	\$0	\$0
Exempt	2	\$10,500	\$5,250	\$15,750

Industrial	0	\$0	\$0	\$0
Agricultural	0	\$0	\$0	\$0
Total	14	\$1,355,458	\$677,729	\$2,033,187
Population estimate for residences:	29			

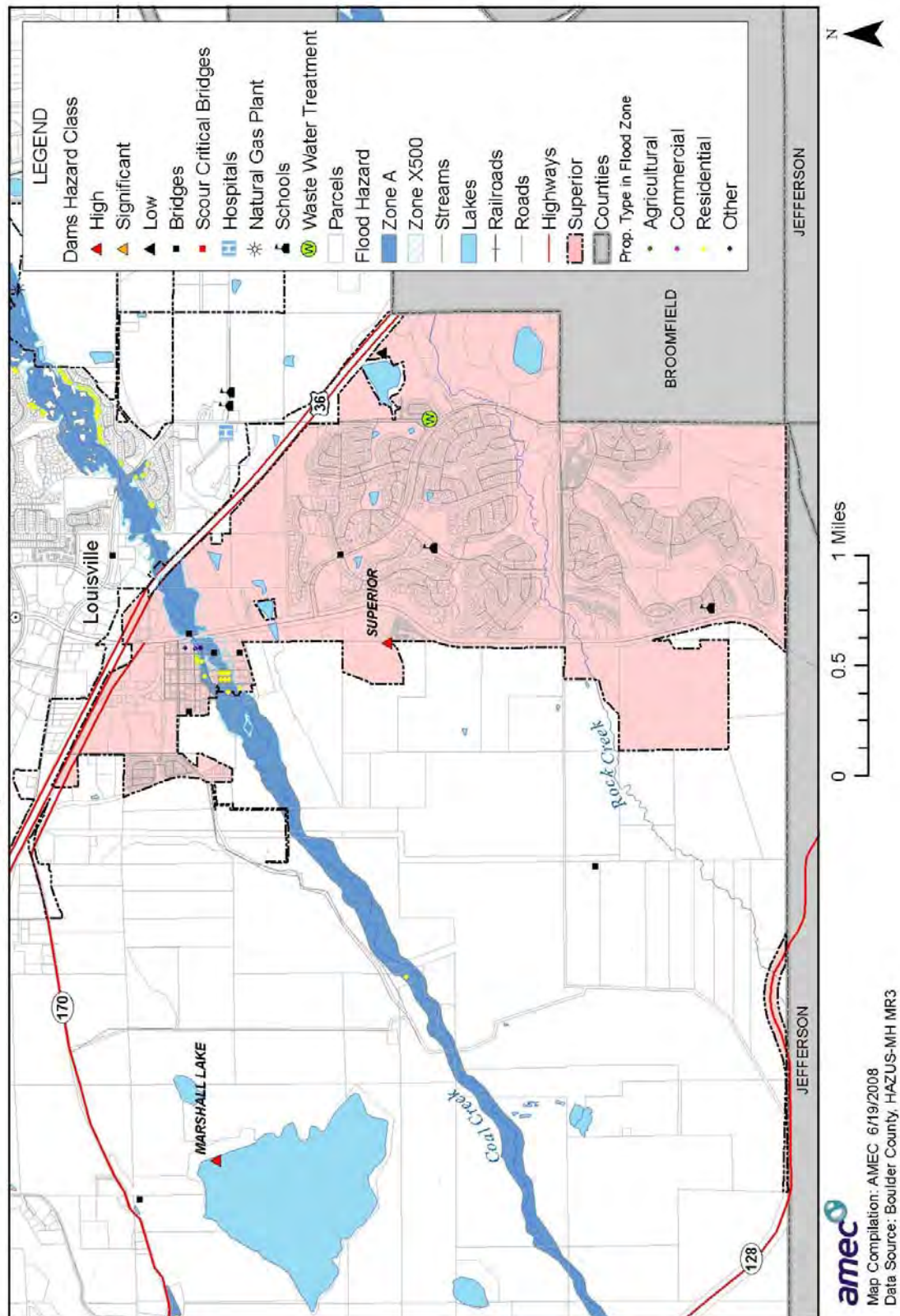
500-Year Flood Zone

Residential	17	\$3,709,896	\$1,854,948	\$5,564,844
Commercial	0	\$0	\$0	\$0
Exempt	3	\$2,073,900	\$1,036,950	\$3,110,850
Industrial	0	\$0	\$0	\$0
Agricultural	0	\$0	\$0	\$0
Total	20	\$5,783,796	\$2,891,898	\$8,675,694
Population estimate for residences:	41			

Combined 100- and 500-Year Flood Zones

Residential	29	\$5,054,854	\$2,527,427	\$7,582,281
Commercial	0	\$0	\$0	\$0
Exempt	5	\$2,084,400	\$1,042,200	\$3,126,600
Industrial	0	\$0	\$0	\$0
Agricultural	0	\$0	\$0	\$0
Total	34	\$7,139,254	\$3,569,627	\$10,708,881
Population estimate for residences:	69			

Figure H 5.2.2 Superior Flood Hazard

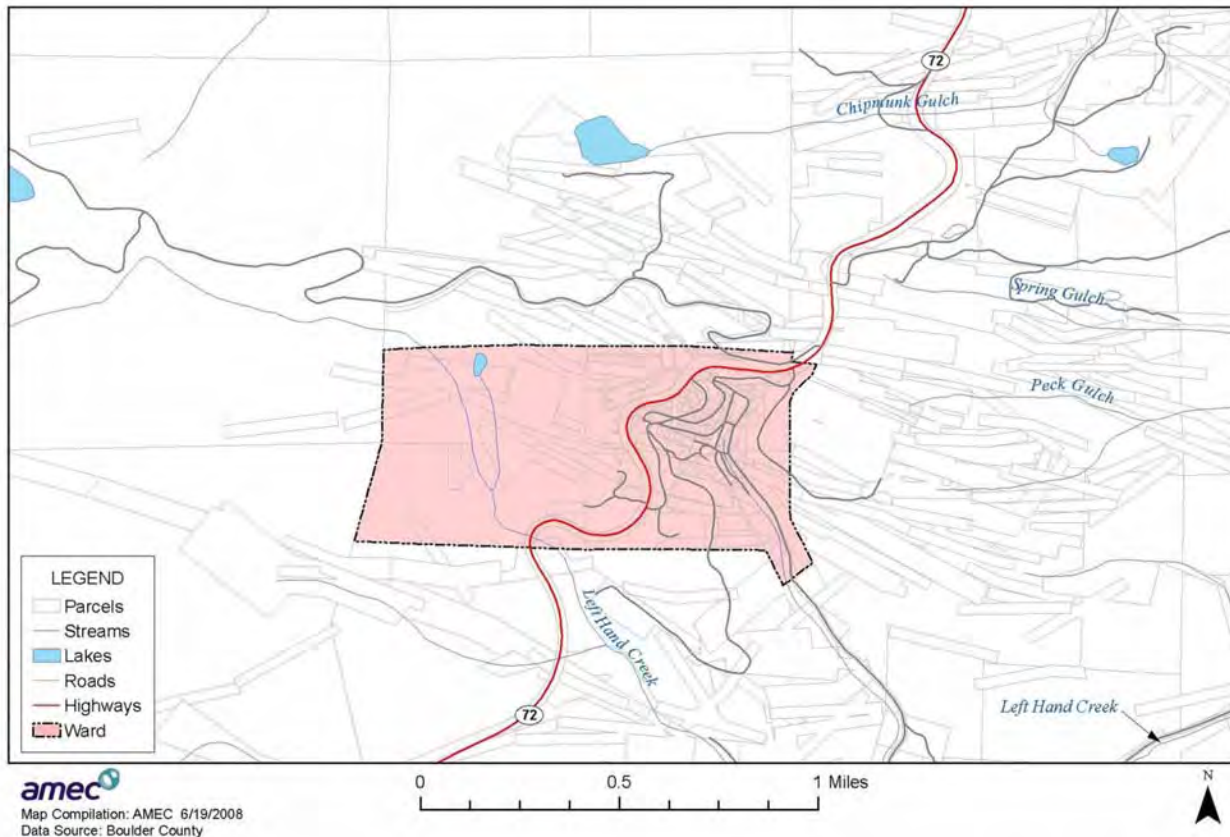


Annex I: Ward

I.1 Community Profile

Ward is a small community located in the mountains of western Boulder County, just off the Peak to Peak highway. Figure I.1 is a base map of the Town of Ward.

Figure I.1. Base Map of Ward



I.1.1 Population

The estimated 2013 population of the Town of Ward was 150. 2010 Census data shows a population of 150. Select Census 2010 demographic and social characteristics for Ward are shown in Table I.1.

Table I.1. Ward's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	60.7
Female (%)	39.3
Under 5 Years (%)	7.3
65 Years and Over (%)	8.1
Race/Ethnicity (one race)	
White (%)	94.7
Hispanic or Latino (Of Any Race) (%)	2.0
Other	
Average Household Size	2.0
High School Graduate or Higher (%)	95.2

Source: U.S. Census Bureau, 2000, www.census.gov/

I.1.2 Economy

According to the 2010 Census, the industries that employed most of Ward's labor force were construction (20.8%); arts, entertainment, recreation, accommodation and food services (9.4%); and professional, scientific, management, administrative, and waste management services (1.9%), Educational services, and health care and social assistance (35.8%), Manufacturing (22.6%), Public Administration (7.5%). Select economic characteristics for Ward from the 2010 Census are shown in Table I.2.

Table I.2. Ward's Economic Characteristics

Characteristic	
Families below Poverty Level, 2010	0
Individuals below Poverty Level, 2010	5.7
Median Home Value 2013	166,700
Median Household Income, 2013	55,625
Per Capita Income, 2013	24,154
Population in Labor Force	89.4

Source: U.S. Census Bureau (2000), www.census.gov/

I.2 Hazard Summary

The most significant hazards for Ward are wildfire, severe winter weather and windstorm. Refer to Section 4.3 Vulnerability Assessment for detailed vulnerability to the wildfire hazard. Other hazards that could impact Ward include drought, hailstorm and lightning.

I.3 Asset Inventory

I.3.1 Property Inventory

Table I.3 represents an inventory of property in Ward based on the Boulder County Assessor's data as of March 12, 2008. No additional assets, such as critical facilities, were identified by the Town during the planning process.

Table I.3. Ward's Property Inventory

Property Type	Parcel Count	Land Values (\$)	Improved Parcel Count	Improved Values (\$)	Total Values (\$)
Residential	98	5,359,100	97	7,783,100	13,142,200
Exempt	50	1,462,400	3	184,100	1,646,500
Vacant	33	542,400	0	0	542,400
Minerals	8	10,000	0	0	10,000
State Assessed	1	0	0	0	0
Unknown	6	0	0	0	0
Total	196	7,373,900	100	7,967,200	15,341,100

Source: Boulder County Assessor's Office

I.3.2 Economic Assets

Economic assets at risk include local businesses:

Marrocco's Restaurant

The Glass Tipi Gallery

Utica Street Market

Millsite Inn

I.3.3 Natural, Historic, and Cultural Resources

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

The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.

If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher. The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

For more information about natural resources in Boulder County, which includes Ward, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

Table I.4 lists the properties in Ward that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties (for more information about these registers, see Section 4.3 Vulnerability Assessment).

Table I.4. Ward's Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Denver, Boulder and Western Railway Historic District	CO 72	9/18/1980
Modoc Mill	North of Ward	12/27/1978
Ward Congregational Church	41 Modoc	8/3/1989
Ward School	66 Columbia	8/3/1989

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/;
National Register Information System, www.nr.nps.gov/

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

Many homes and other buildings in Ward are 50yo+ and therefore are eligible.

I.4 Growth and Development Trends

Table I.5 illustrates how Ward has grown in terms of population and number of housing units between 2000 and 2013.

Table I.5. Ward's Change in Population and Housing Units, 2000-2006

2010 Population	2013 Population	Estimated Percent	2010 # of Housing Units	2013 Estimated # of	Estimated Percent

	Estimate	Change 2010-2013		Housing Units	Change 2000-2006
150	155	+3.30	101	101	0

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/

I.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes Ward's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

I.5.1 Mitigation Capabilities Summary

Table I.6 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Ward.

Table I.6. Ward's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	No	
Zoning ordinance	No	
Subdivision ordinance	Yes	
Growth management ordinance	No	
Floodplain ordinance	No	
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	
BCEGS Rating	No	
Building code	Yes	
Fire department ISO rating	Yes	Rating: 9
Erosion or sediment control program	No	
Stormwater management program	No	
Site plan review requirements	No	
Capital improvements plan	No	
Economic development plan	No	
Local emergency operations plan	Yes	
Other special plans	No	
Flood insurance study or other engineering study for streams	No	
Elevation certificates	No	

Table I.7 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Ward.

Table I.7. Ward's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	No		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No		
Planner/engineer/scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		
Full-time building official	No		
Floodplain manager	No		
Emergency manager	No		
Grant writer	Yes, PT		
Other personnel	No		
GIS Data – Hazard areas	No		
GIS Data – Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to assessor's data	No		
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes		

Table I.8 identifies financial tools or resources that Ward could potentially use to help fund mitigation activities.

Table I.8. Ward's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	No	
Capital improvements project funding	No	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric services	Yes	
Impact fees for new development	No	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	
Incur debt through private activities	?	
Withhold spending in hazard-prone areas	No	

I.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The Town of Ward has not been mapped by FEMA and is not a participant in the National Flood Insurance Program.

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Ward activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

No current projects/activities.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

Encouraging participation in Wildfire Partners, and other mitigation programs

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

Planning to start town lands wildfire mitigation.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

Ongoing community training for emergency planning/response.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

No current projects/activities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

Public awareness program re: Wildfire Partners.

Annex J: Gold Hill

Gold Hill

B.1 Community Profile

B.1.1 Population

300 people

B.1.2 Economy

General Store/Cafe, Restaurant/Inn, Retail (pottery and stained glass) store,

B.2 Hazard Summary

Wildfire, Flood, Severe Storm, Grid Down, Drought, Severe Heat, Severe Cold, Earthquake, Old Mining Tunnels under town and in the Gold Hill area

B.3 Asset Inventory

Safe Site medical and other personal emergency supplies, Safe Site is Gold Hill Elementary School (BVSD) when school is not in session (summer and holidays), Safe Site generator and storage shed

Town Meeting owns amateur radio equipment: repeater and support equipment , 10 licensed ham operators with radios; cemetery, Town land of ____ acres, Town Fire Dept. with 3 apparatus, BCARES repeater on town fire barn, 2 EMTs, 2+ nurses, 1+ doctor, several engineers, 3 heavy equipment contractors

B.3.3 Economic Assets

We are a 501 (c) 4 with a small budget

B.3.4 Natural, Historic, and Cultural Resources

We have a historic district with structures having historic designation: inn, small hotel, cabins

Gold Hill School--said to be one of the two oldest in the county

Historic gold mine

Gold Hill Museum

Natural Resources

Minerals--gold, silver, telluride

Trees

Groundwater

Historic and Cultural Resources

See above

B.4 Growth and Development Trends

0.1% growth

B.5 Capability Assessment

Resilient Community Spirit

B.5.1 Mitigation Capabilities Summary

See above

Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	no	We are unincorporated town within Boulder County
Zoning ordinance	Same--no	Same reason for all 'no' responses below
Subdivision ordinance	no	
Growth management ordinance	no	Historic Gold Hill, a Town Meeting committee
Floodplain ordinance	no	
Site plan review requirements	no	
Other special purpose ordinance (stormwater, steep slope, wildfire)	no	
BCEGS Rating	no	
Building code	no	
Fire department ISO rating	yes	9
Erosion or sediment control program	no	
Stormwater management program	no	
Capital improvements plan	no	
Economic development plan	no	
Local emergency operations plan	yes	Safe Link(=NeighborLink, Safe Site, AirLink)
Other special plans	yes	Researching funding for Safe Site Community Center
Flood insurance study or other engineering study for streams	no	
Elevation certificates	no	
Other	no	

Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	yes	Local resident volunteers	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	yes	Local resident volunteers	
Planner/engineer/scientist with an understanding of natural hazards	yes	Local resident volunteers	
Personnel skilled in GIS	yes	Local resident volunteers	
Full-time building official	yes	Local resident volunteers	
Floodplain manager	no		
Emergency manager	yes	Local resident volunteers	
Grant writer	yes	Local resident volunteers	
Other personnel	yes	Local resident volunteers	
GIS Data – Hazard areas	no	County has done/does this	
GIS Data – Critical facilities	no	Same as above	
GIS Data – Building footprints	no	Same as above	
GIS Data – Land use		Same as above	
GIS Data – Links to assessor's data		Same as above	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	yes	School bell, ham radio	Ham radio repeaters and local licensed operators

Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	yes	We have an ISO rating (9)
Capital improvements project funding	no	
Authority to levy taxes for specific purposes	yes	GHFD can put a vote to our district to levy an increase in taxes for our fire district.
Fees for water, sewer, gas, or electric services	no	
Impact fees for new development	no	
Incur debt through general obligation bonds	no	
Incur debt through special tax bonds	no	
Incur debt through private activities	no	
Withhold spending in hazard-prone areas	no	

Name of action

Hazards Addressed:

All Hazards

Mitigation Goal or Objective Addressed:

Establish Safe Site Community Center/Town Hall

Issue/Background:

Town needs own Safe Site and Community Meeting Center for Emergency Planning, Meeting, Shelter, Medicine, Food, Clothing, Emergency Equipment Storage and Delivery, and Ham Radio Operations Base

Other Alternatives:

none

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

Gold Hill was not listed in the 2008 Plan

Responsible Office:

Gold Hill Town Meeting

Priority (High, Medium, Low):

High

Cost Estimate:

\$300,000.00

Existing or Potential Funding:

Currently seeking funding

Benefits (avoided losses):

Town and surrounding areas and canyons have a Meeting Place, Emergency Response Base, and Safe Shelter for Emergency Planning, Communications, and local population.

Annex K: Town of Nederland

Nederland has been an active participant in this process from the beginning. At the time of adoption the community profiles and mitigation actions were not available to be included in this document.

Nederland has committed to remain a constant partner in the Hazard Mitigation process and will be very active in the update phases of the plan.

All documentation should be available at the adoption meeting for the Town of Nederland.

Annex L: Boulder Valley School District

L.1 Community Profile

Located in the foothills of the Rocky Mountains, the Boulder Valley School District stretches from the peaks of the Continental Divide to the suburbs of Denver. The District covers Boulder, Gold Hill, Jamestown, Lafayette, Louisville, Nederland, Superior, Ward, and parts of Broomfield and Erie. It consists of 55 schools over 500 square miles, approximately 28,500 students, and more than 4000 employees.

L.2 Hazard Summary

The hazards of concern to the school district vary depending on the location of assets. The district identified those hazards of medium significance include dam failure, drought, earthquake, expansive soils, extreme heat, flood, hailstorm, pandemic flu, wildfire, windstorm, and severe winter weather. No hazards ranked as high significance. There district has six facilities located in the 100-year floodplain (indicated in Table J.1 in flood zone A or AE).

L.3 Asset Inventory

Table L.1 is a detailed inventory of assets identified by the District's planning team.

Table L.1. Boulder Valley School District's (RE-2) Assets

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Musical Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
Aspen Creek K-8 School	5500 Aspen Creek	Broomfield	X	2000	114,478	16,889,227	2,572,978	375,287	4,699	51,800	19,893,991
Boulder Community School (Paddock)	805 Gillaspie	Boulder	X	1963	25,569	2,798,087	428,116	82,733	0	0	3,308,936
Eldorado K-8 School	3351 So. Indiana	Superior	X	2000	114,476	17,526,492	2,688,070	320,349	38,779	7,261	20,580,951
Martin Park Head Start	3740 Martin Drive	Boulder	X	1958	4,017	380,359	57,107	0	0	0	437,466
University Hill-Prim. Modular #1	889 17th Street	Boulder	X	1974	1,420	129,870	19,498	0	0	0	149,368
Pioneer Elementary Modular #2	101 E. Baseline Road	Lafayette	X	1974	1,440	113,856	17,084	0	0	0	130,940
Mesa ES Modular #2	1575 Lehigh Street	Boulder	X	1967	900	71,947	10,798	0	0	0	82,745

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Music al Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
Superior ES Modular #2	1800 S. Indiana Street	Superior	X	1994	1,440	113,856	17,084	0	0	0	130,940
Superior ES Modular #3	1800 S. Indiana Street	Superior	X	1997	1,945	148,980	22,357	0	0	0	171,337
Superior ES Modular #4	1800 S. Indiana Street	Superior	X	1997	1,440	113,856	17,807	0	0	0	131,663
Aurora-7 Modular #2- BCSIS	3995 E. Aurora Avenue	Boulder	X	1989	1,440	112,700	16,917	0	0	0	129,617
Majestic Modular #2-Summit	4655 Hanover Avenue	Boulder	X	1989	1,447	132,055	19,826	0	0	0	151,881
Majestic Modular #3-Summit	4655 Hanover Avenue	Boulder	X	2003	1,439	131,401	19,729	0	0	0	151,130
Fireside Elementary	845 W. Dahlia Street	Louisville	X	1989	58,867	5,822,541	874,009	212,146	0	0	6,908,696
Pioneer Elementary	101 E. Baseline Road	Lafayette	X	1925	69,518	8,298,721	1,267,192	284,419	4,849	6,000	9,861,181
Superior Elementary	1800 S. Indiana Street	Superior	X	1996	63,500	8,442,597	1,266,811	509,647	7,195	1,800	10,228,050
Monarch K-8 School	263 Campus Drive	Louisville	X	1997	108,802	15,914,659	2,424,486	550,859	20,374	40,715	18,951,093
Columbine Modular #2	889 17th Street	Boulder	X	1993	1,420	129,870	19,498	0	0	0	149,368
Bear Creek Elementary	2500 Table Mesa Drive	Boulder	X	1971	39,549	4,057,699	608,708	188,079	4,300	11,200	4,869,986
Birch Elementary	1035 Birch Street	Broomfield	X	1972	44,714	5,864,030	879,903	288,288	7,628	16,400	7,056,249
Columbine Elementary	3130 Repplier Street	Boulder	X	1956	48,941	4,906,329	735,949	209,482	7,300	1,600	5,860,660
Crest View Elementary	1897 Sumac Avenue	Boulder	AE	1958	54,994	5,578,186	836,728	361,429	1,200	1,200	6,778,743
Douglass Elementary	840 75th Street	Boulder	X	1952	49,951	5,090,377	763,557	152,813	5,453	1,800	6,014,000
Eisenhower Elementary	1220 Eisenhower Drive	Boulder	X	1971	52,572	5,117,748	768,377	424,087	3,926	2,900	6,317,038
Emerald Elementary	755 Elmhurst Pl.	Broomfield	X	1958	56,300	5,871,722	880,983	328,148	5,300	1,100	7,087,253
Flatirons Elementary	1150 7th Street	Boulder	A	1956	33,468	3,407,668	511,150	280,123	5,800	0	4,204,741

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Music al Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
Foothill Elementary	1001 Hawthorne Avenue	Boulder	X	1949	57,819	5,855,773	878,366	359,724	3,000	0	7,096,863
Gold Hill Elementary	890 Main Street	Gold Hill	X	1915	3,316	360,413	54,111	42,225	1,300	1,800	459,849
Heatherwood Elementary	7750 Concord Drive	Boulder	X	1971	51,092	5,292,051	793,808	328,637	7,300	10,000	6,431,796
Jamestown Elementary	111 Mesa Street	Jamestown	X	1954	5,030	529,668	79,518	19,300	8,600	0	637,086
Kohl Elementary	1000 W 10th Avenue	Broomfield	X	1959	54,113	5,371,567	806,385	285,653	5,600	3,900	6,473,105
Lafayette Elementary	101 N Bermont Avenue	Lafayette	X	1964	53,772	5,462,261	819,339	253,819	13,883	10,788	6,560,090
Ryan Elementary	1405 Centaur Village Drive	Lafayette	X	1983	49,176	5,014,889	752,234	346,380	9,907	4,000	6,127,410
Louisville Elementary	400 Hutchinso n Street	Louisville	X	1964	57,018	5,778,190	866,729	380,835	3,900	1,800	7,031,454
Mapleton Elementary	840 Mapleton Avenue	Boulder	X	1889	21,387	2,412,259	361,867	90,401	1,042	2,000	2,867,569
Creekside Elementary (Martin Park Elem)	3740 Martin Drive	Boulder	X	1956	50,993	4,796,788	719,581	263,538	5,457	1,700	5,787,064
Mesa Elementary	1575 Lehigh Street	Boulder	X	1966	43,870	4,332,539	649,881	264,688	11,059	7,100	5,265,267
Nederland Elementary	1 Sundown Trail	Nederland	X	1989	61,470	8,100,578	1,215,824	220,758	20,758	1,700	9,559,618
Washington Elementary	1215 Cedar Avenue	Boulder	X	1903	29,955	3,286,323	492,948	134,858	4,360	0	3,918,489
Whittier Elementary	2008 Pine Street	Boulder	X	1882	34,163	3,769,035	565,355	186,379	16,227	5,000	4,541,996
Sanchez Elementary	655 Sir Galahad Drive	Lafayette	X	1986	49,887	5,083,856	762,645	214,457	10,720	1,400	6,073,078
Coal Creek Elementary	801 W. Tamarisk	Louisville	X	1984	51,036	5,196,875	779,531	383,572	11,600	9,500	6,381,078
Aurora-7 Elementary BCSIS	3995 East Aurora Avenue	Boulder	X	1963	47,556	4,455,280	683,604	260,204	1,200	1,300	5,401,588
University Hill - Int.	956 16th Street	Boulder	X	1905	52,962	5,787,918	868,391	219,580	2,458	3,000	6,881,347
Coal Creek Modular	801 W. Tamarisk	Louisville	X	1992	1,440	110,157	16,529	0	0	0	126,686
Majestic Campus-	4655 Hanover	Boulder	X	1964	25,568	2,762,961	422,813	40,725	1,760	0	3,228,259

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Musical Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
SUMMIT	Avenue										
Southern Modular #1	1500 Knox Drive	Boulder	X	1965	800	75,970	11,405	0	0	0	87,375
Broomfield Heights MS Garage	1555 Daphne Street	Broomfield	X	1983	715	61,466	9,241	0	0	0	70,707
Southern Modular #2	1500 Knox Drive	Boulder	X	1967	900	83,948	12,602	0	0	0	96,550
Southern Modular #3	1500 Knox Drive	Boulder	X	1965	900	83,948	12,602	0	0	0	96,550
Horizons Campus	4545 Sioux Drive	Boulder	X	1959	26,490	3,200,680	488,744	255,276	2,247	7,299	3,954,246
Burke Modular #1	4545 Sioux Drive	Boulder	X	1993	1,440	129,578	19,454	0	0	0	149,032
Burke Modular #2	4545 Sioux Drive	Boulder	X	1994	1,440	129,578	19,454	0	0	0	149,032
Burke Modular #3	4545 Sioux Drive	Boulder	X	1994	1,440	129,578	19,454	0	0	0	149,032
New Vista High School	700 20th Street	Boulder	X	1953	76,805	8,292,250	1,269,542	356,805	13,629	28,508	9,960,734
Manhattan Middle School	290 Manhattan Drive	Boulder	X	1965	80,692	8,522,570	1,305,306	230,558	3,929	41,762	10,104,125
Casey Middle School	2410 13th Street	Boulder	X	1924	84,007	9,682,914	1,470,942	244,294	6,298	11,895	11,416,343
Centennial Middle School	2205 Norwood Avenue	Boulder	X	1960	99,556	13,871,712	2,118,494	407,620	8,575	19,448	16,425,849
Nevin Platt Middle School	6096 Baseline Road	Boulder	X	1958	117,057	15,516,297	2,370,411	334,213	25,751	38,252	18,284,924
Southern Hills Middle School	1500 Knox Drive	Boulder	X	1963	69,660	9,783,654	1,492,350	304,915	24,984	36,077	11,641,980
Nederland Mid/Sr High	597 Eldora Road	Nederland	X	1971	97,080	14,476,750	2,208,404	400,500	8,596	58,657	17,152,907
Broomfield Heights MS	1555 Daphne Street	Broomfield	X	1983	107,365	14,309,592	2,187,328	460,280	20,744	39,177	17,017,121
Angevine Middle & Track Storage	1150 South Boulder Road	Lafayette	X	1989	121,472	14,501,271	2,221,401	443,272	9,133	23,093	17,198,170
Louisville Middle School	1341 Main Street	Louisville	X	1939	88,887	9,429,109	1,439,151	373,009	26,732	32,583	11,300,584
Boulder	5075	Boulder	X	0	2,500	303,378	45,513	18,462	0	0	367,353

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Music al Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
Prep Charter HS	Chaparral Court										
Centaurus High School Sport Complex	10300 S. Boulder Road	Lafayette	X	1973	2,566	504,016	75,664	0	0	0	579,680
Fairview Sports Complex	1515 Greenbriar Boulevard	Boulder	X	1971	1,237	174,872	26,256	0	0	0	201,128
Monarch HS Storage	329 Campus Drive	Louisville	X	1998	720	29,994	4,501	0	0	0	34,495
Boulder High School	1604 Arapahoe Road	Boulder	AE	1937	229,281	36,707,595	5,589,883	842,466	21,720	57,493	43,219,157
Broomfield High School	1 Eagle Way	Broomfield	X	1959	218,163	25,508,114	3,896,950	663,747	35,499	62,871	30,167,181
Centaurus High School	10300 S. Boulder Road	Lafayette	X	1973	189,010	28,068,391	4,280,185	944,031	29,607	49,905	33,372,119
Fairview High School	1515 Greenbriar Boulevard	Boulder	X	1971	256,392	31,692,421	4,846,562	1,047,913	79,702	71,104	37,737,702
Monarch High School	329 Campus Drive	Louisville	X	1998	228,827	37,721,424	5,742,112	1,026,273	128,464	93,547	44,711,820
Paddock Campus/Community Montessori	805 Gillaspie Drive	Boulder	X	1960	42,547	5,594,558	856,147	235,538	4,046	16,227	6,706,516
Justice High School	537 Canyon Boulevard	Boulder	AE	2006	1,500	104,833	15,733	0	0	0	120,566
Education Center	6500 E. Arapahoe Road	Boulder	X	1963	73,287	6,169,029	926,622	12,131,352	94,121	170,924	19,492,048
University Hill - Primary	889 17th Street	Boulder	X	1949	12,894	1,323,888	202,898	90,216	2,600	0	1,619,602
TEC Auto Mech Garage	6600 E. Arapahoe Road	Boulder	X	1976	631	36,414	5,462	0	0	0	41,876
TEC Auto Mech Modular	6600 E. Arapahoe Road	Boulder	X	1965	800	58,831	8,825	0	0	0	67,656
TEC Modular #2	6600 E. Arapahoe Road	Boulder	X	1989	1,432	108,139	16,231	0	0	0	124,370
TEC Modular #3	6600 E. Arapahoe Road	Boulder	X	1989	1,430	108,002	16,210	0	0	0	124,212
TEC Modular #5	6600 E. Arapahoe	Boulder	X	1987	1,632	126,038	18,921	0	0	0	144,959

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Music al Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
	Road										
Lafayette Bus Garage	1220 Rock Creek Circle	Lafayette	X	2000	3,960	151,212	22,728	0	0	0	173,940
Nederland Bus Garage	225 Ridge Road	Nederland	X	2000	3,960	119,647	17,988	0	0	0	137,635
Transportation/Bus Garage	6500 E. Arapahoe Road	Boulder	X	1982	5,387	289,462	43,547	0	0	0	333,009
Lafayette Bus Terminal	1220 Rock Creek Circle	Lafayette	AE	1977	1,437	92,782	13,917	0	0	0	106,699
Douglass Quonset Hut	840 - 75th Street	Boulder	X	1955	3,503	63,691	9,602	0	0	0	73,293
Career Dev Ctr Modular #1	960 Lee Hill Road	Boulder	X	1970	864	70,942	10,649	0	0	0	81,591
Centaurus HS Modular	10300 S. Boulder Road	Lafayette	X	1974	1,600	145,931	21,900	0	0	0	167,831
Columbine Modular #1	801 West Tamarisk	Louisville	X	1977	1,440	113,856	17,078	0	0	0	130,934
Douglass ES Modular	840 - 75th Street	Boulder	X	1958	1,318	104,176	15,637	0	0	0	119,813
Fireside Elem. Modular	845 W. Dahlia Street	Louisville	X	1992	1,440	113,856	17,084	0	0	0	130,940
Aurora-7 Modular #1 High Peaks	3995 E. Aurora Avenue	Boulder	X	1989	1,440	113,856	17,084	0	0	0	130,940
Majestic Modular #1 Summit	4655 Hanover Avenue	Boulder	X	1970	1,440	131,479	19,741	0	0	0	151,220
Superior ES Modular #1	1800 S. Indiana Street	Superior	X	1994	1,440	113,856	17,084	0	0	0	130,940
Whittier ES Modular	2008 Pine Street	Boulder	X	1989	960	76,128	11,428	0	0	0	87,556
Pioneer Elementary Modular #1	101 E. Baseline Road	Lafayette	X	1974	1,440	113,856	17,084	0	0	0	130,940
TEC Modular #1	6600 E. Arapahoe Road	Boulder	X	1989	1,459	109,918	16,499	0	0	0	126,417
TEC Modular #4	6600 E. Arapahoe Road	Boulder	X	1987	1,632	126,038	18,921	0	0	0	144,959
Mesa ES Modular #1	1575 Lehigh Street	Boulder	X	1967	900	71,947	10,798	0	0	0	82,745
Halcyon School	3100 Bucknell	Boulder	X	1955	8,736	770,715	115,724	45,120	0	0	931,559

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Music al Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
	Court										
Literacy & Language	6556 E. Arapahoe Road	Boulder	X	1983	5,000	379,753	57,023	61,530	0	0	498,306
Boulder High School Sport Complex	1604 Arapahoe Road	Boulder	AE	1947	46,812	1,573,091	237,210	0	0	0	1,810,301
Broomfield HS Sport Complex	1 Eagle Way	Broomfield	X	1960	17,329	1,012,014	152,228	0	0	0	1,164,242
Kohl Cottage & Gazebo	1000 W 10th Avenue	Broomfield	X	1974	3,300	203,917	30,588	0	0	0	234,505
Louisville Middle School Fieldhouse	1341 Main Street	Louisville	X	1939	393	45,558	6,839	0	0	0	52,397
Washington ES Steel Building	1215 Cedar Avenue	Boulder	X	1955	2,464	216,828	32,524	0	0	0	249,352
Ed.Center Warehouse	6500 E. Arapahoe Road	Boulder	X	1953	60,375	2,081,871	313,079	0	0	374,645	2,769,595
Metal Storage Bldg-North	6500 E. Arapahoe Road	Boulder	X	1965	3,765	63,249	9,487	0	0	309,243	381,979
Metal Storage Bldg-South	6500 E. Arapahoe Road	Boulder	X	1965	4,197	83,081	12,520	0	0	0	95,601
TEC Main Building & Arapahoe Ridge	6600 E. Arapahoe Road	Boulder	X	1967	56,001	6,169,308	926,229	2,164,237	84,563	342,408	9,686,745
TEC Trades Building	6600 E. Arapahoe Road	Boulder	X	1965	66,124	8,003,064	1,201,339	0	0	0	9,204,403
N Platt MS Storage-2	6096 Baseline Road	Boulder	X	1960	935	31,964	4,823	0	0	0	36,787
Peak to Peak Charter	800 Merlin Drive	Lafayette	X	2001	116,000	15,042,769	2,257,493	57,639	16,559	4,040	17,378,500
Career Dev Ctr Modular #2	960 Lee Hill Road	Boulder	X	1970	864	70,942	10,649	0	0	0	81,591
Career Dev Ctr Modular #3	960 Lee Hill Road	Boulder	X	1970	818	67,785	10,175	0	0	0	77,960
Eldorado K-8 Modular #1	3351 So. Indiana	Superior	X	1993	1,420	112,452	16,874	0	0	0	129,326
Eldorado K-	3351 So.	Superior	X	1994	1,440	113,856	17,084	0	0	0	130,940

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Music al Instr. Value (\$)	Misc Equip Value (\$)	Total Insured (\$)
8 Modular #2	Indiana										
Eldorado K-8 Modular #3	3351 So. Indiana	Superior	X	2003	1,440	113,856	17,084	0	0	0	130,940
Boulder TEC Greenhouse	6600 E. Arapahoe Road	Boulder	X	0	1,800	19,409	2,928	0	0	0	22,337
Bond Trailer	6500 E. Arapahoe Road	Boulder	X	0	528	24,791	10,000	0	0	0	34,791

L

J.4 Growth and Development Trends

The District will be adding several hundred thousand square feet to existing buildings during the next seven years in response to changing demographics and education program needs.

L.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes the Boulder Valley School District's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

L.5.1 Mitigation Capabilities Summary

Table L.2 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Boulder Valley School District.

Table L.2. Boulder Valley School District's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No/HL*	Comments
Master plan	Yes	Boulder Valley School District Educational Facilities Master Plan, 2006
Zoning ordinance	H/L	
Subdivision ordinance	H/L	
Growth management ordinance	H/L	
Floodplain ordinance	H/L	
Other special purpose ordinance	H/L	

(stormwater, steep slope, wildfire)		
BCEGS Rating	H/L	
Building code	H/L	
Fire department ISO rating	H/L	
Erosion or sediment control program	H/L	
Stormwater management program	Yes	
Site plan review requirements	Yes	
Capital improvements plan	Yes	
Economic development plan	No	
Local emergency operations plan	Yes	
Other special plans		
Flood insurance study or other engineering study for streams	H/L	
Elevation certificates	H/L	

*H/L means a different or higher level of government has authority

Table J.3 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the Boulder Valley School District.

Table J.3. Boulder Valley School District's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Operations/Planner	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Bond Construction/Project Managers	
Planner/engineer/scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		
Full-time building official	No		
Floodplain manager	No		
Emergency manager	Yes	Operations/Director	
Grant writer	Yes		
Other personnel			
GIS Data – Hazard areas			
GIS Data – Critical facilities			
GIS Data – Building footprints			
GIS Data – Land use			
GIS Data – Links to assessor's data			
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	IT/Director	Communicator NXT Phone/Text/Email System

Table J.4 identifies financial tools or resources that the Boulder Valley School District could potentially use to help fund mitigation activities.

Table L.4. Boulder Valley School District's Fiscal Mitigation Capabilities

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

L.5.2 Community Rating System Activities (All Hazards)

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable District activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

Boulder Valley School District Educational Facilities Master Plan, 2006

In 2004, the Boulder Valley School District Board of Education established the Capital Improvement Planning Committee (CIPC) and adopted membership guidelines for its purpose. The purpose of the CIPC is to advise the Board of the long-term facility needs of the District. One of its tasks was to evaluate and update the District's Facility Master Plan. This project was prompted by the aging of school facilities, changes in enrollment patterns, and changes in educational programs. A number of factors, including facility condition, were evaluated for each of the schools and recommendations for improvements were made where appropriate. On November 7, 2006, the voters of the Boulder Valley School District approved Ballot Measure 3A authorizing the issuance of \$296.8 million in bonds for District facility improvements set forth in the plan.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No current projects/activities.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

No current projects/activities.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

The District is working on a revised emergency operations plan for the District and for each school. Implementation is scheduled for August 2008.

The District is working on a revised crisis management plan. Implementation is scheduled for August 2008.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

No current projects/activities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

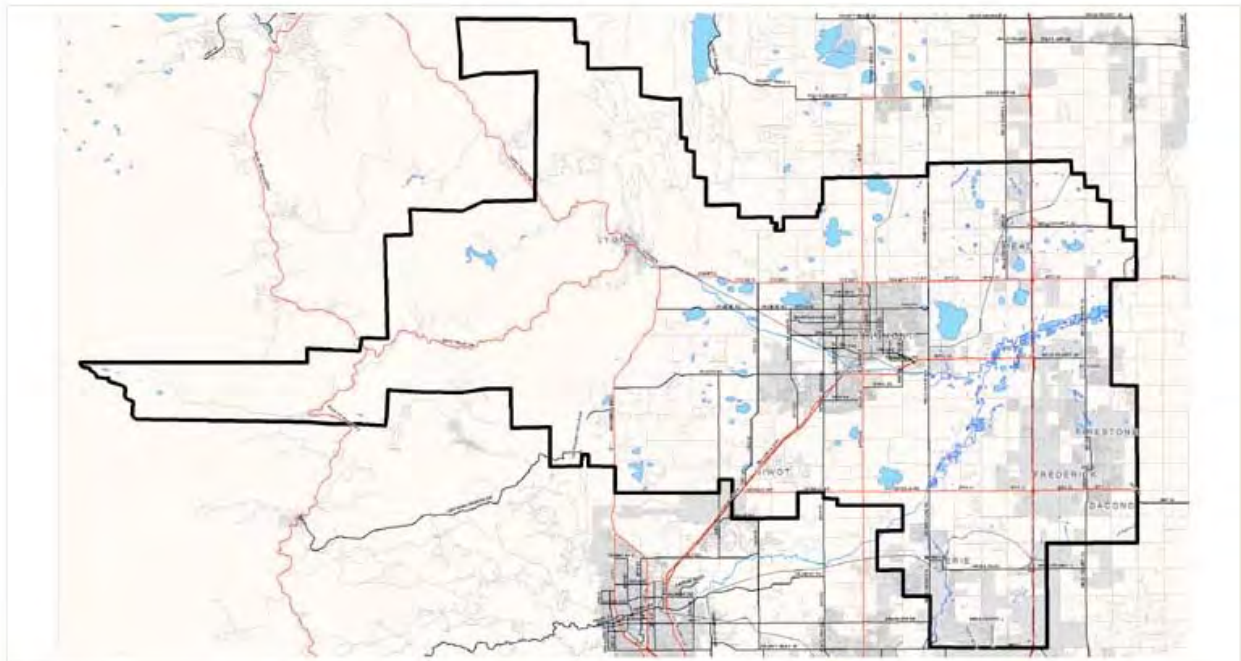
No current projects/activities.

Annex M: St. Vrain Valley School District

M.1 Community Profile

The St. Vrain Valley School District contains approximately 410 square miles located within Boulder, Broomfield, Larimer, and Weld Counties, including all or portions of Dacono, Erie, Firestone, Frederick, Longmont, Lyons, Mead, and unincorporated Hygiene and Niwot. Annexed areas of Boulder and Broomfield are also located in the District. Located approximately 30 miles north of Denver, the District is geographically diverse. Its physical boundaries extend from the Continental Divide into the plains of Colorado. A map of the district boundary is shown in Figure K.1.

Figure M.1 St. Vrain Valley School District Boundary



Source: <http://www.stvrain.k12.co.us/boundaries/district.php>

The District is the educational home of more than 24,000 students (and more than 3,000 teachers and staff). The 10th largest school district in the state, St. Vrain Valley operates 47 schools: 25 Elementary, 9 Middle, 1 Middle/Senior, 9 High, and 3 Charter (as of August 20, 2007).

Elementary Schools

Alpine—2005 Alpine Street (Northeast Longmont)

Burlington—1051 S. Pratt Parkway (South Longmont)

Central—1020 4th Avenue (Central Longmont)

Columbine—111 Longs Peak Avenue (Central Longmont)
Eagle Crest—4444 Clover Basin Drive (Southwest Longmont)
Erie—4127 E. County Line Road (Old Town Erie)
Fall River—1400 Deerwood Drive (East Longmont)
Frederick—555 8th St (East Frederick)
Hygiene—11968 N. 75th (in Hygiene)
Indian Peaks—1335 S. Judson Street (South Longmont)
Legacy—4775 County Road 18 (Frederick)
Loma Linda—333 E. Mountain View (East Longmont)
Longmont Estates—1601 Northwestern Road (West Longmont)
Lyons—338 High Street (in Lyons)
Mead—520 Welker Avenue (in Mead)
Mountain View—1415 14th Avenue (Central Longmont)
Niwot—8778 Morton Road (in Niwot)
Northridge—1200 19th Avenue (North Longmont)
Prairie Ridge—6632 Street Vrain Ranch Boulevard (North Firestone)
Rocky Mountain—800 E. 5th Avenue (East Longmont)
Sanborn—2235 Vivian Street (North Longmont)
Spangler—1440 Collyer Street (Central Longmont)
Elem 23—2000 Mountain View Boulevard (Longmont)
Elem 24—1260 Mountain Drive (Longmont)
Elem 25—10290 Neighbors Parkway (Longmont)

Middle Schools

Altona Middle School—4600 Clover Basin Drive (Longmont)
Coal Ridge Middle School—6201 Booth Drive (Firestone)
Erie Middle School—650 Main Street (Erie)
Heritage—223 E. Mountain View (East Longmont)
Longs Peak—1500 14th Avenue (Central Longmont)
Mead—620 Welker Avenue (in Mead)
Sunset—1300 S. Sunset Street (South Longmont)
Trail Ridge—1000 Button Rock (Longmont)
Westview—1651 Airport Road (West Longmont)

Middle/Senior High School

Lyons Middle/Senior—100 2nd Avenue (South Lyons)

High Schools

Career Development Center—1200 S. Sunset Street (Longmont)
Erie—3180 County Road 5 (Erie)
Frederick—600 5th Street (Frederick)
Longmont—1040 Sunset Street (Central Longmont)
Niwot—8989 E. Niwot Road (in Niwot)

Old Columbine—1200 S. Sunset Street (Longmont)
 Silver Creek—4901 Nelson Road (Longmont)
 Skyline—600 E. Mountain View (East Longmont)
 H.S. #7—12570 County Road 7 (Longmont)

Charter Schools

Carbon Valley Academy (K-8)—4040 Coriolis Way (Frederick)
 Flagstaff Academy (K-8)—1841 Lefthand Circle (Longmont)
 Twin Peaks (K-8)—820 Main Street (Central Longmont)

M.2 Hazard Summary

The hazards of concern to the school district vary depending on the location of assets. The district identified the hazards of high significance to include lightning, pandemic flu, and tornado. Medium significance hazards include dam failure, flood, hailstorm, West Nile virus, windstorm, and severe winter weather. The district has two facilities located in the 100-year floodplain (indicated in Table K.1 in flood zone AE). (Note: the flood risk assessment in Section 4.3 indicates Columbine and Northridge Elementary are in the 500 year floodplain).

M.3 Asset Inventory

Table M.1 is a detailed inventory of assets identified by the District's planning team.

Table M.1. St. Vrain Valley School District's Assets

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Musical Inst (\$)	Misc. Equip Value (\$)	Total Insured(\$)
Trail Ridge Middle School	1000 Button Rock	Longmont	X	2004	120,369	13,852,244	2,108,127	561,500	35,000	71,000	16,627,871
Central Elementary	1020 4th Avenue	Longmont	X	1903	56,907	7,172,642	1,094,131	248,000	6,000	39,000	8,559,773
LHS: Evenly Montgomery	1090 Sunset Street	Longmont	X	1964	19,344	1,071,528	161,976	0	0	0	1,233,504
Longmont High School	1040 Sunset	Longmont	X	1962	183,132	21,218,383	3,239,924	926,500	280,000	101,500	25,766,307
Portable #20 - Longmont	1040 Sunset Street	Longmont	X	1995	1,440	132,906	19,938	0	0	0	152,844
Portable #21 - Longmont	1040 Sunset Street	Longmont	X	1995	1,440	132,906	19,938	0	0	0	152,844
Burlington Elementary	1051 S. Pratt Pkwy	Longmont	X	1966	49,312	5,878,585	897,149	248,000	6,000	239,00	7,029,734
Columbine Elem. (New)	111 Longs Peak Av	Longmont	X	1949	389,968	4,824,875	736,278	0	0	0	5,561,153
Columbine Elem.(Old),	111 Longs Peak Av	Longmont	X	1906	21,135	2,795,230	426,411	248,000	6,000	39,000	3,514,641
Northridge Elementary	1200 19th Avenue	Longmont	X	1970	47,536	5,722,136	873,120	248,000	6,000	41,000	6,890,256

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Musical Inst (\$)	Misc. Equip Value (\$)	Total Insured(\$)
Career Dev. Center	1200 South Sunset	Longmont	X	1971	76,476	8,627,872	2,262,000	926,500	0	101,500	11,917,872
CDC Animal Shelter - 4	1200 South Sunset	Longmont	X	1975	872	9,204	1,388	0	0	0	10,592
CDC Greenhouse	1200 South Sunset	Longmont	X	2003	4,980	61,631	9,470	0	0	0	71,101
CDC Plant & Environments	1200 South Sunset	Longmont	X	2000	3,730	575,845	86,469	0	0	0	662,314
CDC Storage Units - 3	1200 South Sunset	Longmont	X	1975	3,166	53,245	8,035	0	0	0	61,280
Portable #12 CDC	1200 South Sunset	Longmont	X	1965	1,440	132,906	19,938	0	0	0	152,844
Portable 913 - CDC	1200 South Sunset	Longmont	X	1965	1,440	132,906	19,938	0	0	0	152,844
Portable 1114 - CDC	1200 South Sunset	Longmont	X	1965	1,440	132,906	19,938	0	0	0	152,844
Portable #15 - CDC	1200 South Sunset	Longmont	X	1965	1,440	132,906	19,938	0	0	0	152,844
Portable #16 - CDC	1200 South Sunset	Longmont	X	1965	1,440	132,906	19,938	0	0	0	152,844
Sunset Middle School	1300 South Sunset	Longmont	X	1975	94,271	10,656,674	1,627,492	561,500	35,000	71,000	12,951,666
Indian Peaks Elementary	1335 South Judson	Longmont	X	1976	39,331	4,759,579	726,287	248,000	6,000	39,000	5,778,866
Fall River Elementary	1400 Deerwood Dr	Longmont	X	2001	49,909	5,997,160	915,179	248,000	5,000	0	7,165,339
Portable 42 - Fall River	1400 Deerwood Dr	Longmont	X	2002	1,440	132,906	19,938	0	0	0	152,844
Portable 49 - Fall River	1400 Deerwood Dr	Longmont	X	2002	1,440	132,906	19,938	0	5	0	152,844
Mountain View Elem	1415 14th Avenue	Longmont	C	1957	39,227	4,747,341	724,470	248,000	6,000	439,000	5,764,811
Portable 6 - Spangler Elem	1440 Collyer St	Longmont	AEX	1985	1,440	132,906	19,938	0	0	0	152,844
Portable 28 Spangler Elem	1440 Collyer St.	Longmont	AEX	1997	1,440	132,906	19,938	0	0	0	152,844
Spangler Elem	1440 Collyer St.	Longmont	AEX	1962	48,509	4,964,080	759,973	248,000	6,000	39,000	6,017,053
Longs Peak Middle School	1500 14 th Avenue	Longmont	X	1966	89,517	9,811,100	1,498,958	561,500	35,000	71,000	11,977,558
Portable #27 – Long Peak	1500 14 th Avenue	Longmont	X	1997	1,440	132,906	19,938	0	0	0	152,844
Alpine Elementary	2005 Alpine Street	Longmont	X	2004	49,620	6,287,813	962,363	248,000	6,000	39,000	7,543,176
Sanborn Elementary	2235 Vivian Street	Longmont	X	1984	49,500	5,950,210	908,008	248,000	6,000	39,000	7,151,218
Heritage Middle School	233 East Mountain	Longmont	X	1966	93,546	10,052,729	1,536,752	561,500	35,000	71,000	12,256,981
Heritage Middle School Storage	233 East Mountain	Longmont	X	1970	725	30,289	4,721	0	0	0	35,010

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Musical Inst (\$)	Misc. Equip Value (\$)	Total Insured(\$)
Portable #25- Heritage Middle School	233 East Mountain	Longmont	X	1996	1,440	132,906	19,938	0	0	0	152,844
Portable #8- Heritage Middle School	233 East Mountain	Longmont	X	1993	1,440	132,906	19,938	0	0	0	152,844
Clover Basin Educational School	2929 Clover Basin	Longmont	X	1988	60,401	5,196,517	3,017,633	769,500	0	52,603	9,036,253
Clover Basin ESC Storage	2929 Clover Basin	Longmont	X	2002	3,308	122,670	19,090	0	0	0	141,760
Loma Linda Elementary	333 East Mountain	Longmont	X	1970	45,427	4,657,274	712,920	248,000	6,000	39,000	5,663,194
Portable #18- Loma Linda Elem	333 East Mountain	Longmont	X	1994	1,440	132,906	19,938	0	0	0	152,844
Portable #33- Loma Linda Elem.	333 East Mountain	Longmont	X	2001	1,440	132,906	19,938	0	0	0	152,844
Portable #51- Loma Linda Elem.	333 East Mountain	Longmont	X	2003	1,440	132,906	19,938	0	0	0	152,844
Portable #1 – ESC	395 Pratt Parkway	Longmont	X	1978	1,440	123,828	18,576	0	0	0	142,404
Administration Building (ESC)	395 South Pratt Parkway	Longmont	X	1968	16,116	1,770,567	270,035	1,260,000	1,000	10,000	3,311,602
Administration Building An	395 South Pratt Parkway	Longmont	X	1964	16,467	1,362,217	329,300	0	0	0	1,691,517
Operations & Maintenance	395 South Pratt Parkway	Longmont	X	1982	34,672	2,116,386	520,000	0	0	500,000	3,136,386
Pole Barn	395 South Pratt Parkway	Longmont	X	1990	2,793	50,004	13,000	0	0	0	63,004
Little Red Brick Building	401 S. Pratt Pkwy	Longmont	X	1980	1,250	33,930	5,090	0	0	0	39,020
Portable #2- LSC (learning)	401 S. Pratt Pkwy	Longmont	X	1978	1,440	123,828	18,576	0	0	0	142,404
Learning Service Center	401 S. Pratt Pkwy	Longmont	X	2000	13,610	1,518,442	272,000	190,000	0	10,000	1,990,442
Lashley Building	410 Lashley Street	Longmont	X	1978	17,958	1,566,320	235,190	0	0	0	1,801,510
Eagle Crest Elementary	4444 Clover Basin	Longmont	X	1999	47,400	5,973,583	910,984	248,000	6,000	39,000	7,177,567
Portable #44- Eagle Crest	4444 Clover Basin	Longmont	X	2002	1,440	132,906	19,938	0	0	0	152,844
Portable #50 - Eagle Crest	4444 Clover Basin 1	Longmont	X	2003	1,440	132,906	19,938	0	0	0	152,844
Portable #22 - Skyline High	600 East Mountain	Longmont	X	1996	1,440	132,906	19,938	0	0	0	152,844

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Musical Inst (\$)	Misc. Equip Value (\$)	Total Insured(\$)
Portable #23-Skyline High	600 East Mountain	Longmont	X	1996	1,440	132,906	19,938	0	0	0	152,844
Portable #24 - Skyline High	600 East Mountain	Longmont	X	1996	1,440	132,906	199,381	0	0	0	152,844
Portable #26 - Skyline High	600 East Mountain	Longmont	X	1997	1,440	132,906	19,938	0	0	0	152,844
Skyline High Baseball Facility	600 East Mountain	Longmont	X	2007	4,080	247,526	37,540	0	0	0	285,066
Skyline High School	600 East Mountain	Longmont	X	1977	187,984	21,356,613	3,262,123	926,500	280,000	101,500	25,926,736
Adult Ed - East Building	619 Bowen Street	Longmont	X	1916	7,140	553,055	84,577	0	0	0	637,632
Adult Ed - West Building	619 Bowen Street	Longmont	X	1952	4,560	363,751	55,621	0	0	0	419,372
Student Services Center	700 Ken Pratt Blvd.	Longmont	X	2000	0	0	80,000	0	0	0	80,000
Portable #19 - Rocky Mountain	800 East 5th Ave.	Longmont	X	1995	1,440	132,906	19,938	0	0	0	152,844
Rocky Mountain Elementary	800 East 5th Ave.	Longmont	X	1976	39,331	4,759,579	726,287	248,000	6,000	39,000	5,778,866
Twin Peaks Charter Academy	820 Main Street	Longmont	X	1926	71,788	7,562,939	1,134,441	0	0	0	8,697,380
Hygiene Elementary	11968 North 75th Street	Longmont	X	1979	42,154	5,091,479	776,958	248,000	6,000	39,000	6,161,437
Longmont Estates Elementary	1601 Northwestern	Longmont	X	1971	44,518	5,368,715	819,286	248,000	6,000	39,000	6,481,001
West View Middle School	1651 Airport Road	Longmont	X	1991	105,323	11,950,069	1,824,984	561,500	35,000	71,000	14,442,553
Portable #38 – Eagle Crest	4444 Clover Basin	Longmont	X	2001	1,440	132,906	19,938	0	0	0	152,844
Portable #55-Eagle Crest	4444 Clover Basin	Longmont	X	2002	1,440	132,906	19,938	0	0	0	152,844
Altona Middle School	4600 Clover Basin	Longmont	X	2005	120,369	13,661,192	2,049,179	561,500	35,000	71,000	16,377,871
Silver Creek High School	4901 Nelson Road	Longmont	X	2001	179,166	20,260,520	3,095,672	926,500	280,000	135,500	24,698,192
Silver Creek High School	4901 Nelson Road	Longmont	X	2001	2,109	207,274	32,259	0	0	0	239,533
Niwot Elementary	877 Morton Road	Niwot	X	1966	48,020	5,778,267	881,754	248,000	6,000	39,000	6,953,021
Niwot High School	8989 East Niwot Road	Niwot	X	1972	147,277	16,736,646	2,556,429	926,500	280,000	103,500	20,603,075
Niwot High School Concessions	8989 East Niwot Road	Niwot	X	1998	1,300	155,878	23,382	0	0	0	179,260
Niwot High School Weight	8989 East Niwot Road	Niwot	X	1980	3,124	235,777	36,090	0	0	0	271,867
Erie Elementary	4137 E. County Line	Erie	X	1966	43,359	5,233,176	798,533	248,000	6,000	39,000	6,324,709

Building Name	Address	City	Flood Zone	Year	Square Feet	Building Value (\$)	Contents (\$)	EDP Value (\$)	Musical Inst (\$)	Misc. Equip Value (\$)	Total Insured(\$)
Lyons Middle/High School	100 2nd Avenue	Lyons	X	1974	77,906	8,655,009	2,262,000	926,500	25,000	101,500	11,970,009
Lyons Middle/High School	100 2nd Avenue	Lyons	X	1975	1,171	27,800	4,170	0	0	0	31,970
Lyons Middle/High School	100 2nd Avenue	Lyons	X	2001	2,970	381,860	58,103	0	0	0	439,963
Lyons Elementary	338 High Street	Lyons	X	1976	42,904	5,344,347	815,396	248,000	6,000	39,000	6,452,743

M.4 Growth and Development Trends

Growth has been significant in the District over the last few years, and the diminishing availability of acceptable sites for future schools has become apparent. The District is actively working to identifying future school sites to address the full build-out potential within the St. Vrain Valley to help assure that the District can obtain appropriately located school sites for current and future students.

There have been several periods of rapid growth in the history of the St. Vrain Valley School District. The first school constructed in Longmont was Central Elementary in the late 1800s. From 1900 to 1949 four more schools were completed. In the 1960's the District was consolidated from several smaller districts to the present configuration. The decade of the 1960s also included the first big wave of school construction with the completion of 7 new schools. The 1970s followed with the largest construction boom with the addition of 14 new schools.

Growth proceeded at a moderate rate through the 1980s with only one new school opened. Beginning in the 1990s, growth began to accelerate leading into the first decade of 2000. Two new schools opened in the 1990s. The decade of 2000 is expected to be a record breaking decade for the construction of new school facilities. 11 new schools were either already opened or expected to be open by 2006 and another 4 more included in the bond election of 2002 that are expected to be constructed in the near future.

The total District population has increased over the last 10 years along with student enrollment. Since District boundaries do not match up with community and County lines, population data is difficult to obtain; however, estimates have been developed for the District as a whole and are shown in Table K.2.

Table M.2. St. Vrain Valley School District Population Growth 1990-2005

Year	Estimated Population	Growth	Average Yearly
1990	73,862		
1996	85,700	11,838	1,973
2000	109,052	23,352	5,838
2003	128,494	19,442	6,481
2004	136,910	8,416	8,416
2005	141,040	4,130	4,130
Total/Average		67,178	4,443

Source: St. Vrain Valley School District Comprehensive Facility Plan

A build-out analysis detailed in the comprehensive facility plan suggests a total need for 62 elementary schools, 20 middle schools, 13 high schools, and 1 middle/senior high school. The district-wide student equivalent is approximately 31,253 elementary students, 15,495 middle school students, and 18,228 high school students. This brings approximately 64,976 K-12 students to the District at full build-out. The timing of the addition of students to reach this level is unknown. Assuming a growth rate of approximately 500 new students per year, which is consistent with the 1990s, full build-out could be achieved in about 85 years. Growth at a level of 750 students per year as demonstrated in 2000 would achieve the maximum enrollment in about 58 years. And at 1,000 students per year, build-out could be reached in about 43 years.

M.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes the St. Vrain Valley School District's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

M.5.1 Mitigation Capabilities Summary

Table K.3 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the St. Vrain Valley School District.

Table M.3. St. Vrain Valley School District's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	St. Vrain Valley School District Comprehensive Facilities Plan, 2006
Zoning ordinance	Yes	Local jurisdictions, City and County
Subdivision ordinance	No	Local jurisdictions, City and County
Growth management ordinance	No	Local jurisdictions, City and County
Floodplain ordinance	No	Local jurisdictions, City and County
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	See comprehensive plan
BCEGS Rating		Local jurisdictions, City and County
Building code	Yes	Local jurisdictions, City and County
Fire department ISO rating		Local jurisdictions, City and County
Erosion or sediment control program	Yes	Local jurisdictions, City and County
Stormwater management program	Yes	Local jurisdictions, City and County
Site plan review requirements	Yes	Local jurisdictions, City and County
Capital improvements plan	Yes	
Economic development plan	n/a	
Local emergency operations plan	Yes	The District began emergency operations planning in the 1990s and has acquired a federal REMS grant to improve and strengthen plans
Other special plans	No	
Flood insurance study or other engineering study for streams	Yes	Local jurisdictions, City and County
Elevation certificates	No	

Table M.4 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the St. Vrain Valley School District.

Table M.4. St. Vrain Valley School District's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Operations and Maintenance	2 architects
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Operations and Maintenance	2 architects
Planner/engineer/scientist with an understanding of natural hazards	Yes	Operations and Maintenance	2 architects
Personnel skilled in GIS	Yes	Planning	
Full-time building official	No		
Floodplain manager	No		
Emergency manager	Yes	Shared responsibilities in	

Personnel Resources	Yes/No	Department/Position	Comments
		multiple departments; under consideration	
Grant writer	No	Multiple departments	
Other personnel	Yes	18-Month Project Director	REMS Grant
GIS Data – Hazard areas	Yes		
GIS Data – Critical facilities	Yes		
GIS Data – Building footprints	Yes		
GIS Data – Land use	Yes		
GIS Data – Links to assessor's data	Yes		
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	City of Longmont; Towns of Lyons, Erie, Niwot, and Hygiene	

Table M.5 identifies financial tools or resources that the St. Vrain Valley School District could potentially use to help fund mitigation activities.

Table M.5. St. Vrain Valley School District's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	No	School districts not eligible
Capital improvements project funding	Yes	Bond issues
Authority to levy taxes for specific purposes	Yes	Property tax plus possible mill levy
Fees for water, sewer, gas, or electric services	No	
Impact fees for new development	Yes	Cash-in-lieu for land acquisition voluntary capital mitigation
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	Bond issues
Incur debt through private activities	No	

M.5.2 Community Rating System Activities (All Hazards)

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable District activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the *CRS Coordinator's Manual*.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

St. Vrain Valley School District Comprehensive Facility Plan

The purpose of St. Vrain Valley School District Comprehensive Facility Plan is to guide the District in the identification of the long-range land and facility needs of the District and to locate future school sites to serve as neighborhood focal points. The plan recognizes the need to site schools outside of hazard-prone areas. Undesirable site issues include undermining or subsidence on the site, severe topography with slopes greater than 8 percent, poor soils and drainage, 100-year floodplain, and geological hazards.

Other

The school district follows BMPs in construction for storm ready management, under the state and municipalities jurisdiction on fire safety, as applied to new construction.

When planning for new schools the District works with local communities and developers to provide constraint mapping that addresses such issues as undermining, soil types, floodplain, open space, airport influence, and oil wells.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

No current projects/activities.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions. They are usually implemented by parks, recreation, or conservation agencies or organizations.

No current projects/activities.

Emergency Services

Emergency services measures are taken during an emergency to minimize its impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

No current projects/activities.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

No current projects/activities.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

School district public information programs address energy, water, fire safety, and the environment and include safety drills (fire, tornado, lockdown, and evacuation).

Annex N: Fire Districts

The following tables summarize the property types, values, and population for each fire district with a moderate or higher fire hazard rating, categorized by the rating level. See the discussion in Section 4.3 on wildfire vulnerability for more details

Table N.1. Allenspark Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel Count	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop
Unincorporated	High Hazard	Residential	292	280	\$30,686,000	\$33,782,600	\$64,468,600	674.80	25.45%
		Agricultural	8	3	\$474,400	\$4,300	\$478,700	-	-
		Exempt	15	2	\$126,400	\$10,165,400	\$10,291,800	-	-
		Vacant	66	-	-	\$3,026,700	\$3,026,700	-	-
		<<unknown>>	6	-	-	-	-	-	-
	Moderate Hazard	Residential	615	581	\$67,391,200	\$60,261,700	\$127,652,900	1,400.21	52.82%
		Commercial	15	15	\$875,800	\$656,500	\$1,532,300	-	-
		Agricultural	29	7	\$1,598,400	\$19,000	\$1,617,400	-	-
		Exempt	42	4	\$650,100	\$32,052,600	\$32,702,700	-	-
		Minerals	3	-	-	\$2,600	\$2,600	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	145	-	-	\$8,497,800	\$8,497,800	-	-
		<<unknown>>	8	-	-	-	-	-	-
	Low Hazard	Residential	248	239	\$30,745,000	\$26,568,800	\$57,313,800	575.99	21.73%
		Agricultural	17	6	\$1,846,600	\$7,700	\$1,854,300	-	-
		Commercial	5	5	\$170,200	\$333,000	\$503,200	-	-
		Exempt	15	2	\$5,614,600	\$17,289,500	\$22,904,100	-	-
		Minerals	3	-	-	\$600	\$600	-	-
		Vacant	59	-	-	\$6,417,900	\$6,417,900	-	-
		<<unknown>>	2	-	-	-	-	-	-
	No Risk	Vacant	2	-	-	\$7,000	\$7,000	-	-
	Total		1596	1144	\$140,178,700	\$199,093,700	\$339,272,400	2,651.00	

Table N.2. Berthoud Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	<<unknown>>	1	-	-	-	-	-	-
	High Hazard	Agricultural	1	1	\$356,700	\$1,000	\$357,700	-	-
		Residential	1	1	\$168,400	\$121,600	\$290,000	2.41	1.47%
		Exempt	4	-	-	\$2,167,200	\$2,167,200	-	-
	Moderate Hazard	Residential	2	2	\$220,300	\$383,600	\$603,900	4.82	2.94%
		Agricultural	1	-	-	\$100	\$100	-	-
		Minerals	1	-	-	\$500	\$500	-	-
	Low Hazard	Residential	66	65	\$20,303,800	\$16,345,100	\$36,648,900	156.65	95.59%
		Agricultural	73	34	\$17,284,300	\$322,500	\$17,606,800	-	-
		Exempt	22	3	\$175,800	\$9,679,200	\$9,855,000	-	-
		Minerals	22	-	-	\$15,600	\$15,600	-	-
		Vacant	9	-	-	\$1,136,300	\$1,136,300	-	-
		<<unknown>>	5	-	-	-	-	-	-
	Total		208	106	\$38,509,300	\$30,172,700	\$68,682,000	163.88	

Table N.3. Boulder Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel Count	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Boulder	Very High Hazard	Residential	19	19	\$6,028,900	\$4,151,300	\$10,180,200	45.79	0.07%
		Exempt	6	-	-	\$16,800,200	\$16,800,200	-	-
	Moderate Hazard	Residential	3	3	\$5,030,000	\$3,525,100	\$8,555,100	7.23	0.01%
		Exempt	1	-	-	-	-	-	-
	Low Hazard	Residential	26,505	26,107	\$6,751,006,017	\$6,174,978,800	\$12,925,984,817	62,917.87	98.15%
		Commercial	1,382	1,341	\$1,432,379,200	\$1,306,520,800	\$2,738,900,000	-	-
		Exempt	700	317	\$716,100,400	\$739,273,800	\$1,455,374,200	-	-
		Industrial	250	247	\$419,216,300	\$224,720,500	\$643,936,800	-	-
		Agricultural	5	3	\$398,000	\$6,000	\$404,000	-	-
		Minerals	8	-	-	\$3,700	\$3,700	-	-
		State Assessed	23	-	-	-	-	-	-
		Vacant	220	-	-	\$100,960,100	\$100,960,100	-	-
		<<unknown>>	34	-	-	-	-	-	-
	No Risk	Residential	51	51	\$20,625,500	-	\$20,625,500	122.91	0.19%
		Exempt	1	-	-	\$1,000	\$1,000	-	-
Unincorporated	Very High Hazard	Residential	1	1	\$300	\$6,000	\$6,300	2.41	0.00%
		Exempt	5	-	-	\$505,800	\$505,800	-	-
	High Hazard	Exempt	4	-	-	\$8,803,300	\$8,803,300	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	3	-	-	\$305,700	\$305,700	-	-
		<<unknown>>	1	-	-	-	-	-	-
	Moderate Hazard	Residential	4	4	\$1,911,700	\$3,037,800	\$4,949,500	9.64	0.02%
		Agricultural	1	-	-	\$1,000	\$1,000	-	-
		Exempt	10	-	-	\$2,915,700	\$2,915,700	-	-
		Minerals	1	-	-	\$300	\$300	-	-
	Low Hazard	Residential	417	415	\$88,761,500	\$60,245,700	\$149,007,200	1,000.15	1.56%
		Commercial	13	13	\$5,776,900	\$9,019,700	\$14,796,600	-	-
		Industrial	9	9	\$6,080,700	\$4,231,200	\$10,311,900	-	-
		Agricultural	13	8	\$1,383,600	\$28,300	\$1,411,900	-	-
		Exempt	59	6	\$2,122,500	\$60,933,500	\$63,056,000	-	-

Location	Fire Hazard Rating	Property Type	Total Parcel Count	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
		Minerals	10	-	-	\$10,300	\$10,300	-	-
		State Assessed	6	-	-	-	-	-	-
		Vacant	12	-	-	\$1,581,600	\$1,581,600	-	-
		<<unknown>>	2	-	-	-	-	-	-
	No Risk	State Assessed	1	-	-	-	-	-	-
		<<unknown>>	1	-	-	-	-	-	-
		Total		29782	28544	\$9,456,821,517	\$8,722,567,200	\$18,179,388,717	64,106.00

Table N.4. Boulder Mountain Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.	
Unincorporated	Very High Hazard	Residential	141	137	\$52,785,500	\$45,094,400	\$97,879,900	330.17	14.62%	
		Agricultural	7	3	\$733,400	\$3,500	\$736,900	-	-	
		Exempt	12	2	\$244,700	\$1,467,600	\$1,712,300	-	-	
		Minerals	1	-	-	\$100	\$100	-	-	
		Vacant	17	-	-	\$3,495,500	\$3,495,500	-	-	
		<<unknown>>	3	-	-	-	-	-	-	
	High Hazard	Residential	274	272	\$83,886,100	\$76,018,200	\$159,904,300	655.52	29.03%	
		Agricultural	5	1	\$1,170,600	\$2,700	\$1,173,300	-	-	
		Exempt	5	-	-	\$1,022,200	\$1,022,200	-	-	
		Minerals	8	-	-	\$12,700	\$12,700	-	-	
		Vacant	35	-	-	\$7,495,200	\$7,495,200	-	-	
	Moderate Hazard	Residential	424	417	\$148,411,200	\$122,426,800	\$270,838,000	1,004.97	44.50%	
		Agricultural	8	3	\$2,930,100	\$11,400	\$2,941,500	-	-	
		Exempt	6	-	-	\$949,400	\$949,400	-	-	
		Minerals	1	-	-	\$100	\$100	-	-	
		Vacant	46	-	-	\$8,750,200	\$8,750,200	-	-	
		Low Hazard	Residential	111	111	\$44,475,200	\$41,244,600	\$85,719,800	267.51	11.85%
			Agricultural	6	5	\$1,326,400	\$6,400	\$1,332,800	-	-
			Exempt	8	-	-	\$1,920,100	\$1,920,100	-	-
			Vacant	7	-	-	\$1,596,100	\$1,596,100	-	-
			<<unknown>>	2	-	-	-	-	-	-
Total			1127	951	\$335,963,200	\$311,517,200	\$647,480,400	2,258.17		

Table N.5. Boulder Rural Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Boulder	Low Hazard	Residential	32	31	\$17,087,200	\$16,903,800	\$33,991,000	74.71	4.75%
		Vacant	2	-	-	\$4,900	\$4,900	-	-
Unincorporated	Very High Hazard	Residential	58	53	\$18,325,200	\$19,744,500	\$38,069,700	127.73	8.13%
		Agricultural	4	1	\$1,089,700	\$800	\$1,090,500	-	-
		Exempt	10	1	\$8,000	\$1,426,300	\$1,434,300	-	-
		Vacant	10	-	-	\$364,900	\$364,900	-	-
	High Hazard	Residential	2	2	\$1,310,400	\$1,044,600	\$2,355,000	4.82	0.31%
		Vacant	1	-	-	\$480,300	\$480,300	-	-
	Moderate Hazard	Residential	68	65	\$19,249,100	\$23,854,300	\$43,103,400	156.65	9.97%
		Agricultural	5	-	-	\$2,400	\$2,400	-	-
		Exempt	8	-	-	\$586,400	\$586,400	-	-
		Vacant	3	-	-	\$841,300	\$841,300	-	-
	Low Hazard	Residential	521	501	\$212,237,100	\$159,413,300	\$371,650,400	1,207.41	76.84%
		Agricultural	40	31	\$13,965,300	\$171,400	\$14,136,700	-	-
		Exempt	52	6	\$425,600	\$37,691,800	\$38,117,400	-	-
		Industrial	3	3	\$496,600	\$398,500	\$895,100	-	-
		Commercial	2	2	\$349,400	\$1,800	\$351,200	-	-
		Minerals	5	-	-	\$2,700	\$2,700	-	-
		Vacant	17	-	-	\$4,324,200	\$4,324,200	-	-
		<<unknown>>	16	-	-	-	-	-	-
		Total	859	696	\$284,543,600	\$267,258,200	\$551,801,800	1,571.32	

Table N.6. Coal Creek Canyon Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	High Hazard	Residential	89	87	\$15,339,900	\$15,447,500	\$30,787,400	209.67	17.47%
		Agricultural	4	1	\$229,900	\$600	\$230,500	-	-
		Exempt	8	1	\$214,600	\$4,298,800	\$4,513,400	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	40	-	-	\$2,056,600	\$2,056,600	-	-
	Moderate Hazard	Residential	257	252	\$33,884,300	\$23,636,400	\$57,520,700	607.32	50.60%
		Exempt	13	2	\$386,500	\$1,864,700	\$2,251,200	-	-
		Agricultural	3	1	\$109,000	\$800	\$109,800	-	-
		Commercial	1	1	\$91,600	\$80,300	\$171,900	-	-
		State Assessed	2	-	-	-	-	-	-
		Vacant	52	-	-	\$1,776,500	\$1,776,500	-	-
		<<unknown>>	1	-	-	-	-	-	-
	Low Hazard	Residential	160	159	\$28,143,200	\$18,996,900	\$47,140,100	383.19	31.93%
		Exempt	4	-	-	\$123,100	\$123,100	-	-
		State Assessed	3	-	-	-	-	-	-
		Vacant	30	-	-	\$1,868,000	\$1,868,000	-	-
		<<unknown>>	1	-	-	-	-	-	-
	No Risk	Exempt	1	-	-	\$396,000	\$396,000	-	-
	Total		670	504	\$78,399,000	\$70,546,200	\$148,945,200	1,200.18	

Table N.7. Eldorado Springs Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	Residential	52	52	\$7,270,500	\$14,117,400	\$21,387,900	125.32	18.64%
		Commercial	2	2	\$472,600	\$156,200	\$628,800	-	-
		Exempt	8	1	\$54,800	\$962,900	\$1,017,700	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	19	-	-	\$344,700	\$344,700	-	-
		<<unknown>>	3	-	-	-	-	-	-
	High Hazard	Exempt	3	-	-	\$282,700	\$282,700	-	-
	Moderate Hazard	Residential	57	56	\$7,992,900	\$11,852,200	\$19,845,100	134.96	20.07%
		Commercial	3	2	\$361,800	\$212,700	\$574,500	-	-
		Agricultural	1	1	\$144,500	\$200	\$144,700	-	-
		Exempt	13	-	-	\$2,039,800	\$2,039,800	-	-
		Minerals	2	-	-	\$2,800	\$2,800	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	15	-	-	\$1,048,600	\$1,048,600	-	-
		<<unknown>>	1	-	-	-	-	-	-
	Low Hazard	Residential	173	171	\$51,073,600	\$66,070,800	\$117,144,400	412.11	61.29%
		Agricultural	21	10	\$2,303,800	\$35,800	\$2,339,600	-	-
		Exempt	67	6	\$755,100	\$5,344,900	\$6,100,000	-	-
		Commercial	5	5	\$1,285,100	\$2,380,300	\$3,665,400	-	-
		Minerals	9	-	-	\$18,300	\$18,300	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	11	-	-	\$1,302,100	\$1,302,100	-	-
		<<unknown>>	2	-	-	-	-	-	-
	No Risk	Exempt	2	-	-	\$2,300	\$2,300	-	-
		Vacant	1	-	-	\$2,900	\$2,900	-	-
		Total	473	306	\$71,714,700	\$106,177,600	\$177,892,300	672.39	

Table N.8. Four Mile Canyon Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	Residential	101	96	\$22,799,000	\$20,314,300	\$43,113,300	231.36	28.40%
		Agricultural	18	1	\$145,200	\$6,700	\$151,900	-	-
		Exempt	24	-	-	\$6,089,290	\$6,089,290	-	-
		Minerals	9	-	-	\$27,300	\$27,300	-	-
		Vacant	13	-	-	\$1,415,600	\$1,415,600	-	-
		<<unknown>>	2	-	-	-	-	-	-
	High Hazard	Residential	132	127	\$23,354,300	\$19,811,600	\$43,165,900	306.07	37.57%
		Exempt	31	4	\$445,000	\$3,932,700	\$4,377,700	-	-
		Agricultural	3	-	-	\$800	\$800	-	-
		Minerals	90	-	-	\$260,400	\$260,400	-	-
		Vacant	40	-	-	\$2,429,200	\$2,429,200	-	-
		<<unknown>>	7	-	-	-	-	-	-
	Moderate Hazard	Residential	113	107	\$19,421,200	\$18,740,700	\$38,161,900	257.87	31.66%
		Agricultural	13	1	\$1,027,700	\$16,200	\$1,043,900	-	-
		Exempt	32	1	\$86,200	\$4,316,110	\$4,402,310	-	-
		Minerals	29	-	-	\$68,000	\$68,000	-	-
		Vacant	19	-	-	\$1,061,400	\$1,061,400	-	-
		<<unknown>>	5	-	-	-	-	-	-
	Low Hazard	Residential	8	8	\$1,680,100	\$1,696,900	\$3,377,000	19.28	2.37%
		Agricultural	2	-	-	\$200	\$200	-	-
		Exempt	2	-	-	\$1,837,400	\$1,837,400	-	-
		Minerals	11	-	-	\$75,000	\$75,000	-	-
	Total		704	345	\$68,958,700	\$82,099,800	\$151,058,500	814.58	

Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	
Zoning ordinance	Yes	Boulder County standards
\		

Subdivision ordinance	No	
Growth management ordinance	No	
Floodplain ordinance	Yes	
Site plan review requirements	Yes	
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	
BCEGS Rating	N/A	
Building code	Yes	
Fire department ISO rating	Yes	8
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Capital improvements plan	N/A	
Economic development plan	N/A	
Local emergency operations plan	Yes	
Other special plans	N/A	
Flood insurance study or other engineering study for streams	N/A	
Elevation certificates	N/A	
Other		

Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Symmetry Builders/General Contractor	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Symmetry Builders/General Contractor	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Four Mile FPD	
Personnel skilled in GIS	No		
Full-time building official	N/A		
Floodplain manager	N/A		
Emergency manager	Yes		

Grant writer	Yes	Four Mile FPD	
Other personnel	Yes	Four Mile FPD	
GIS Data – Hazard areas	Yes		
GIS Data – Critical facilities	Yes		
GIS Data – Building footprints	Yes		
GIS Data – Land use	Yes		
GIS Data – Links to assessor's data	Yes		
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)			

Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Staffing/project implementation grant applications
Capital improvements project funding	No	
Authority to levy taxes for specific purposes	No	
Fees for water, sewer, gas, or electric services	No	
Impact fees for new development	No	
Incur debt through general obligation bonds	No	
Incur debt through special tax bonds	No	
Incur debt through private activities	No	
Withhold spending in hazard-prone areas	No	

Four Mile Canyon Drive Defensible Space and Hazardous Fuels Reduction Project

Hazards Addressed: Hazards include fire danger to life safety, residences, critical infrastructure and personal property.

Mitigation Goal or Objective Addressed: The project objective is to create defensible space around 140 structures along the main corridor of our district and to treat 150 acres of contiguous hazardous fuels along this same corridor, totaling 364 acres.

Issue/Background: The Four Mile Fire Protection District has been severely impacted by recent fire and flood events. The proposed project will offer wildfire mitigation to a community that has suffered terrible devastation over the past five years. In addition to the immediate benefit of wildfire prevention, avoiding future wildfire events will have a correlative flood mitigation impact, as scientific study has overwhelmingly demonstrated the increased flood potential in wildfire affected areas.

Other Alternatives: Fuel reduction/wildfire mitigation projects at property owners' discretion and at their expense. This would not have a comparable benefit to the proposed, comprehensive, district-wide mitigation Defensible Space and Hazardous Fuels Reduction Project. While individual property owners may elect to have Defensible Space or Hazardous Fuels Reduction treatment performed on their property, the effectiveness of the district-wide project is salient in its cumulative effect.

New or Deferred Action: New action

Responsible Office: Four Mile Fire Protection District

Priority (High, Medium, Low): High

Cost Estimate: \$650,750

Existing or Potential Funding: \$200,000 awarded by the Colorado Department of Natural Resources. Funding in the amount of \$450,750 applied for through the Hazard Mitigation Grant Program.

Benefits (avoided losses):

The benefit of mitigation against large-scale fire spread is in life safety, property preservation, critical infrastructure protection and ecological preservation. Avoided losses are difficult to predict with accuracy, but wildfire impact resulting from large-scale incidents has included loss of life, and destruction measured in the billions of dollars.

Potential or current subject matter expertise: The project has been planned and will be implemented by the Four Mile Fire Crew, which has xxx years of expert fire mitigation services. The Fire Crew performs work with reference to mitigation standards set forth by the Colorado State Forest Service, and will consult with experts as needed on ancillary issues such as bio-mass utilization, wildlife protection and any other issues as they might arise.

Schedule:

Project implementation will begin upon notice of awarded funding. The expected timeline for project completion is roughly 16 months.

Emergency Generator Purchase/Installation

Hazards Addressed: Potential loss of power to primary fire station/command center and resultant worsening of response capabilities and operational efficiency.

Mitigation Goal or Objective Addressed: Objective is to ensure uninterrupted communications and functionality of our fire protection district's primary fire station and command center.

Issue/Background: In 2014, construction began on the Fourmile Fire Protection District's Poorman Station. Achieving the needed level of funding for station construction has been difficult. Currently, there are no funds available for purchasing a mission critical emergency generator. Funds have been applied for through the Colorado Division of Homeland Security and Emergency Management Hazard Mitigation Grant Program.

Other Alternatives: If funding is not awarded for this project, the alternative will likely be the purchase of a less powerful, portable generator. This alternative would be significantly inferior to our proposed project. A portable generator could power limited communications and lights in the event of grid power loss. While this would allow the station to maintain basic functions, it would not allow the station to serve as a command center during an emergency.

New or Deferred Action: New action

Responsible Office: Four Mile Fire Protection District

Priority (High, Medium, Low): High

Cost Estimate: \$25,000

Existing or Potential Funding: Potential funding source is the CODHSEM HMGP.

Benefits (avoided losses): Benefits of this project will relate to the continued functionality of our primary fire station during weather or natural disaster events resulting in the loss of grid power. These benefits will be in the form of life safety and property preservation.

Potential or current subject matter expertise: Symmetry Builders has been employed as the general contractor for station construction and will be tasked with the generator's installation if funds are awarded. Symmetry Builders has extensive experience in generator installation.

Schedule: Notification of awarded funds is expected presently. Upon notice of funds, a contract with the state will be negotiated. The state has allowed 3 months for this process. Upon contract completion, the generator will be purchased, a concrete pad will be installed, pre-wiring work for the generator will be performed and the generator will be installed and testing will be conducted. The total project timeline estimate, provided by Symmetry Builders is roughly 3 weeks.

Table N.9. Gold Hill Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	High Hazard	Residential	42	36	\$8,424,400	\$6,501,300	\$14,925,700	86.76	17.39%
		Exempt	52	-	-	\$5,388,900	\$5,388,900	-	-
		Minerals	72	-	-	\$142,700	\$142,700	-	-
		Vacant	10	-	-	\$422,500	\$422,500	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Moderate Hazard	Residential	61	55	\$12,343,600	\$9,747,500	\$22,091,100	132.55	26.57%
		Agricultural	6	3	\$489,800	\$1,500	\$491,300	-	-
		Exempt	57	2	\$218,500	\$7,596,400	\$7,814,900	-	-
		Industrial	1	1	\$17,700	\$159,300	\$177,000	-	-
		Minerals	56	-	-	\$162,000	\$162,000	-	-
		Vacant	10	-	-	\$1,430,700	\$1,430,700	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Low Hazard	Residential	118	116	\$15,717,100	\$13,822,200	\$29,539,300	279.56	56.04%
		Agricultural	7	4	\$1,532,100	\$3,700	\$1,535,800	-	-
		Commercial	2	2	\$188,900	\$278,600	\$467,500	-	-
		Exempt	24	2	\$324,900	\$5,847,100	\$6,172,000	-	-
		Minerals	16	-	-	\$36,700	\$36,700	-	-
		Vacant	26	-	-	\$678,800	\$678,800	-	-
		<<unknown>>	2	-	-	-	-	-	-
		Total	566	221	\$39,257,000	\$52,219,900	\$91,476,900	498.87	

Table N.10. High Country Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Nederland	Low Hazard	Exempt	1	-	-	\$34,400	\$34,400	-	-
Unincorporated	High Hazard	Residential	211	205	\$32,664,800	\$30,628,700	\$63,293,500	494.05	46.59%
		Agricultural	8	5	\$968,400	\$9,400	\$977,800	-	-
		Exempt	14	-	-	\$2,425,700	\$2,425,700	-	-
		Minerals	26	-	-	\$84,600	\$84,600	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	26	-	-	\$3,256,900	\$3,256,900	-	-
	Moderate Hazard	Residential	143	138	\$26,948,100	\$25,234,300	\$52,182,400	332.58	31.36%
		Agricultural	5	3	\$893,100	\$2,700	\$895,800	-	-
		Exempt	7	1	\$199,000	\$1,096,200	\$1,295,200	-	-
		Vacant	6	-	-	\$17,300	\$17,300	-	-
		<<unknown>>	25	-	-	\$2,747,100	\$2,747,100	-	-
			2	-	-	-	-	-	-
	Low Hazard	Residential	100	97	\$21,978,700	\$19,885,900	\$41,864,600	233.77	22.05%
		Agricultural	20	9	\$1,499,700	\$48,200	\$1,547,900	-	-
		Exempt	9	-	-	\$1,951,900	\$1,951,900	-	-
		Minerals	5	-	-	\$9,600	\$9,600	-	-
		Vacant	16	-	-	\$1,665,300	\$1,665,300	-	-
		<<unknown>>	5	-	-	-	-	-	-
	Total		630	458	\$85,151,800	\$89,098,200	\$174,250,000	1,060.40	

Table N.11. Hygiene Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Longmont	Low Hazard	Residential	1,385	1,331	\$349,556,900	\$117,141,900	\$466,698,800	3,207.71	63.62%
		Agricultural	7	6	\$1,550,200	\$127,200	\$1,677,400	-	-
		Exempt	42	5	\$13,908,800	\$11,966,500	\$25,875,300	-	-
		Industrial	5	5	\$90,107,400	\$15,657,800	\$105,765,200	-	-
		Commercial	7	4	\$6,135,600	\$11,190,400	\$17,326,000	-	-
		Minerals	1	-	-	\$300	\$300	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	34	-	-	\$10,544,600	\$10,544,600	-	-
		<<unknown>>	2	-	-	-	-	-	-
Unincorporated	Very High Hazard	Residential	7	6	\$2,007,300	\$1,255,800	\$3,263,100	14.46	0.29%
	High Hazard	Exempt	4	-	-	\$1,946,800	\$1,946,800	-	-
	Moderate Hazard	Residential	3	3	\$2,942,900	\$1,437,600	\$4,380,500	7.23	0.14%
		Agricultural	1	-	-	\$500	\$500	-	-
		Exempt	5	-	-	\$3,365,500	\$3,365,500	-	-
		Minerals	1	-	-	\$200	\$200	-	-
		Vacant	1	-	-	\$603,200	\$603,200	-	-
		<<unknown>>	1	-	-	-	-	-	-
		Low Hazard	Residential	767	752	\$258,706,400	\$185,420,300	\$444,126,700	1,812.32
	Agricultural		376	222	\$79,265,900	\$2,443,200	\$81,709,100	-	-
	Exempt		156	22	\$7,626,100	\$46,419,120	\$54,045,220	-	-
	Commercial		12	12	\$2,107,200	\$1,783,700	\$3,890,900	-	-
	Industrial		1	1	\$107,000	\$105,000	\$212,000	-	-
	Minerals		57	-	-	\$2,615,930	\$2,615,930	-	-
	State Assessed		11	-	-	-	-	-	-
	Vacant		75	-	-	\$12,529,900	\$12,529,900	-	-
	<<unknown>>		13	-	-	-	-	-	-
	Total		2975	2369	\$814,021,700	\$426,555,450	\$1,240,577,150	5,041.72	

Table N.12. Indian Peaks Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Ward	Moderate Hazard	Residential	28	28	\$2,409,600	\$1,368,900	\$3,778,500	67.48	8.41%
		Exempt	21	1	\$6,700	\$928,600	\$935,300	-	-
		Minerals	5	-	-	\$8,700	\$8,700	-	-
		Vacant	11	-	-	\$265,400	\$265,400	-	-
	Low Hazard	Residential	70	69	\$5,373,500	\$3,990,200	\$9,363,700	166.29	20.72%
		Exempt	28	2	\$177,400	\$531,800	\$709,200	-	-
		Minerals	3	-	-	\$1,300	\$1,300	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	22	-	-	\$277,000	\$277,000	-	-
		<<unknown>>	6	-	-	-	-	-	-
	No Risk	Exempt	1	-	-	\$2,000	\$2,000	-	-
Unincorporated	High Hazard	Residential	1	1	\$61,400	\$88,800	\$150,200	2.41	0.30%
		<<unknown>>	1	-	-	-	-	-	-
	Moderate Hazard	Residential	134	132	\$13,919,700	\$12,268,700	\$26,188,400	318.12	39.64%
		Agricultural	15	8	\$1,336,000	\$16,000	\$1,352,000	-	-
		Exempt	68	2	\$38,200	\$62,340,700	\$62,378,900	-	-
		Minerals	81	-	-	\$388,700	\$388,700	-	-
		Vacant	94	-	-	\$5,097,900	\$5,097,900	-	-
		<<unknown>>	9	-	-	-	-	-	-
	Low Hazard	Residential	103	100	\$14,927,900	\$13,209,900	\$28,137,800	241.00	30.03%
		Agricultural	24	8	\$844,300	\$115,800	\$960,100	-	-
		Exempt	65	2	\$1,224,900	\$67,064,700	\$68,289,600	-	-
		Minerals	49	-	-	\$370,000	\$370,000	-	-
		Vacant	68	-	-	\$3,108,400	\$3,108,400	-	-
		<<unknown>>	4	-	-	-	-	-	-
	No Risk	Residential	5	3	\$1,367,100	\$630,700	\$1,997,800	7.23	0.90%
		Exempt	8	-	-	\$1,871,200	\$1,871,200	-	-
		<<unknown>>	1	-	-	-	-	-	-
		Total	926	356	\$41,686,700	\$173,945,400	\$215,632,100	802.53	

Table N.13. Jamestown Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Jamestown	High Hazard	Residential	85	82	\$12,724,100	\$9,668,000	\$22,392,100	197.62	60.74%
		Commercial	1	1	\$80,900	\$77,400	\$158,300	-	-
		Exempt	11	-	-	\$449,400	\$449,400	-	-
		Minerals	4	-	-	\$25,800	\$25,800	-	-
		Vacant	21	-	-	\$677,500	\$677,500	-	-
	Moderate Hazard	Residential	53	52	\$8,466,200	\$5,641,900	\$14,108,100	125.32	38.52%
		Exempt	8	1	\$273,100	\$1,491,100	\$1,764,200	-	-
		Vacant	28	-	-	\$416,800	\$416,800	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Low Hazard	Residential	2	1	\$320,200	\$123,900	\$444,100	2.41	0.74%
		Exempt	3	-	-	\$327,800	\$327,800	-	-
		Minerals	2	-	-	\$6,500	\$6,500	-	-
		Vacant	2	-	-	\$20,900	\$20,900	-	-
Total			222	137	\$21,864,500	\$18,927,000	\$40,791,500	325.35	

Table N.14. Left Hand Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	Residential	77	74	\$36,204,000	\$25,338,800	\$61,542,800	178.34	9.46%
		Agricultural	7	2	\$410,300	\$3,700	\$414,000	-	-
		Exempt	12	-	-	\$6,593,500	\$6,593,500	-	-
		Minerals	1	-	-	\$100	\$100	-	-
		Vacant	6	-	-	\$1,378,600	\$1,378,600	-	-
		<<unknown>>	1	-	-	-	-	-	-
	High Hazard	Residential	41	33	\$4,852,300	\$3,655,800	\$8,508,100	79.53	4.22%
		Agricultural	7	3	\$621,000	\$4,000	\$625,000	-	-
		Exempt	19	1	\$58,800	\$12,409,800	\$12,468,600	-	-
		Minerals	34	-	-	\$59,400	\$59,400	-	-
		Vacant	25	-	-	\$1,079,400	\$1,079,400	-	-
		<<unknown>>	5	-	-	-	-	-	-
	Moderate Hazard	Residential	373	364	\$103,237,000	\$74,425,100	\$177,662,100	877.24	46.55%
		Exempt	52	6	\$4,737,500	\$37,480,100	\$42,217,600	-	-
		Agricultural	14	3	\$516,000	\$5,800	\$521,800	-	-
		Minerals	47	-	-	\$133,700	\$133,700	-	-
		Vacant	89	-	-	\$6,874,400	\$6,874,400	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Low Hazard	Residential	326	309	\$89,797,800	\$69,943,100	\$159,740,900	744.69	39.51%
		Agricultural	65	37	\$16,765,700	\$90,400	\$16,856,100	-	-
		Exempt	62	7	\$1,836,200	\$23,710,700	\$25,546,900	-	-
		Industrial	4	4	\$2,110,000	\$4,077,800	\$6,187,800	-	-
		Minerals	7	-	-	\$49,900	\$49,900	-	-
		Vacant	69	-	-	\$5,615,600	\$5,615,600	-	-
		<<unknown>>	1	-	-	-	-	-	-
	No Risk	Residential	2	2	\$1,296,300	\$961,400	\$2,257,700	4.82	0.26%
		Vacant	2	-	-	\$138,800	\$138,800	-	-
		<<unknown>>	1	-	-	-	-	-	-
		Total	1351	845	\$262,442,900	\$274,029,900	\$536,472,800	1,884.62	

Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Lefthand CWPP
Zoning ordinance	Yes	Boulder County
Subdivision ordinance	Yes	Boulder County
Growth management ordinance	Yes	Boulder County
Floodplain ordinance	Yes	Boulder County
Site plan review requirements	Yes	Boulder County
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Boulder County
BCEGS Rating		
Building code	Yes	Boulder County
Fire department ISO rating	Yes	9
Erosion or sediment control program	Yes	Boulder County
Stormwater management program		
Capital improvements plan		
Economic development plan	Yes	Boulder County
Local emergency operations plan	Yes	Boulder County
Other special plans	Yes	Boulder County
Flood insurance study or other engineering study for streams	Yes	Boulder County
Elevation certificates		
Other		

Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Boulder County Land use	
Engineer/professional trained in construction practices related to buildings	No		

and/or infrastructure			
Planner/engineer/scientist with an understanding of natural hazards	Yes	Lefthand FPD	
Personnel skilled in GIS	Yes	Boulder County Land Use	
Full-time building official	Yes	Boulder County	
Floodplain manager	Yes	Boulder County Land use	
Emergency manager	Yes	Boulder OEM Mike Chard	
Grant writer	Yes	Lefthand FPD	
Other personnel			
GIS Data – Hazard areas	Yes	Boulder County Land Use	
GIS Data – Critical facilities	Yes	Lefthand FPD CWPP	
GIS Data – Building footprints	Yes	Boulder County Assessor	
GIS Data – Land use	Yes	Boulder County Land Use	
GIS Data – Links to assessor's data	Yes	Boulder County Assessor	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Boulder County Communications	Everbridge

Fiscal Mitigation Capabilities

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

Name of action Lefthand Drainages

Hazards Addressed: Hazard standing snag trees

Mitigation Goal or Objective Addressed: Remove standing hazard snag trees from the canyon roadways

Issue/Background: These are flood-affected trees that have drowned, and are dead, and pose a direct threat to Lefthand and James Canyon users. That threat is due to the potential to hit/kill or injure canyon users as a result of falling, either due to wind or aging processes.

Other Alternatives: None

New or Deferred Action: A new action is one not listed in the 2008 Multi-Hazard Mitigation Plan. A deferred action is an action previously listed but not accomplished.

New action, removing flood killed trees that threaten the roadway.

Responsible Office: Lefthand FPD, Boulder County Transportation.

Priority (High, Medium, Low): High due to life safety issues

Cost Estimate: \$12,350 (Personnel 120h @ \$80/h: \$9600; Truck 15 days @\$50/d: \$750; Chipper 20h @ \$100/h: \$2000; \$12,350)

Existing or Potential Funding: FEMA post event hazard mitigation funding

Benefits (avoided losses): Preserving the life/health of canyon users

Potential or current subject matter expertise: Lefthand FPD Mitigation Crew

Schedule: November 2014-January 2015

Table N.15. Lyons Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Lyons	Very High Hazard	Residential	8	8	\$1,291,800	\$1,089,400	\$2,381,200	19.28	0.74%
		Industrial	1	1	\$500	\$34,400	\$34,900	-	-
		Exempt	2	-	-	\$33,700	\$33,700	-	-
		Vacant	1	-	-	\$76,600	\$76,600	-	-
	High Hazard	Residential	1	-	-	-	-	-	-
	Moderate Hazard	Residential	58	57	\$21,801,800	\$7,529,800	\$29,331,600	137.37	5.29%
		Commercial	1	1	\$243,300	\$99,500	\$342,800	-	-
		Exempt	1	-	-	\$9,600	\$9,600	-	-
		Vacant	14	-	-	\$2,066,300	\$2,066,300	-	-
	Low Hazard	Residential	655	650	\$144,535,900	\$72,593,100	\$217,129,000	1,566.50	60.35%
		Commercial	34	34	\$7,017,500	\$3,454,800	\$10,472,300	-	-
		Exempt	44	10	\$3,576,400	\$5,883,700	\$9,460,100	-	-
		Industrial	2	2	\$363,300	\$211,200	\$574,500	-	-
		State Assessed	2	-	-	-	-	-	-
		Vacant	90	-	-	\$7,056,200	\$7,056,200	-	-
		<<unknown>>	2	-	-	-	-	-	-
	No Risk	Residential	1	-	-	-	-	-	-
Unincorporated	Very High Hazard	Residential	95	95	\$23,319,500	\$17,567,600	\$40,887,100	228.95	8.82%
		Exempt	19	2	\$70,300	\$8,902,800	\$8,973,100	-	-
		Agricultural	4	1	\$203,900	\$2,900	\$206,800	-	-
		Commercial	1	1	\$179,600	\$148,200	\$327,800	-	-
		Minerals	1	-	-	\$200	\$200	-	-
		Vacant	18	-	-	\$1,839,800	\$1,839,800	-	-
	High Hazard	Residential	15	15	\$3,085,200	\$2,819,300	\$5,904,500	36.15	1.39%
		Agricultural	4	3	\$832,300	\$1,400	\$833,700	-	-
		Exempt	14	1	\$37,600	\$11,770,900	\$11,808,500	-	-
		Minerals	1	-	-	\$500	\$500	-	-
		Vacant	2	-	-	\$352,600	\$352,600	-	-
	Moderate Hazard	Residential	139	138	\$36,045,100	\$24,988,000	\$61,033,100	332.58	12.81%
		Agricultural	15	5	\$717,200	\$40,700	\$757,900	-	-
		Exempt	53	1	\$7,400	\$42,693,900	\$42,701,300	-	-

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
		Industrial	1	1	\$32,000	-	\$32,000	-	-
		Minerals	9	-	-	\$1,800	\$1,800	-	-
		Vacant	57	-	-	\$6,462,200	\$6,462,200	-	-
		<<unknown>>	5	-	-	-	-	-	-
	Low Hazard	Residential	116	112	\$29,360,900	\$22,875,300	\$52,236,200	269.92	10.40%
		Agricultural	21	8	\$2,083,700	\$362,900	\$2,446,600	-	-
		Commercial	5	5	\$431,900	\$305,400	\$737,300	-	-
		Exempt	45	4	\$696,088	\$8,177,800	\$8,873,888	-	-
		Minerals	5	1	\$3,800	\$887,600	\$891,400	-	-
		Vacant	26	-	-	\$2,979,600	\$2,979,600	-	-
		<<unknown>>	5	-	-	-	-	-	-
	No Risk	Residential	2	2	\$20,700	\$360,000	\$380,700	4.82	0.19%
		Exempt	3	-	-	\$6,806,000	\$6,806,000	-	-
		Vacant	1	-	-	\$93,400	\$93,400	-	-
	Total		1599	1158	\$275,957,688	\$260,579,100	\$536,536,788	2,595.57	Total

Table N.16 Nederland Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Nederland	High Hazard	Residential	9	9	\$2,106,100	\$1,322,700	\$3,428,800	21.69	0.64%
		Vacant	3	-	-	\$280,400	\$280,400	-	-
	Moderate Hazard	Residential	285	283	\$42,585,300	\$40,439,500	\$83,024,800	682.03	20.04%
		Commercial	4	4	\$700,500	\$525,600	\$1,226,100	-	-
		Exempt	15	1	\$17,400	\$801,100	\$818,500	-	-
		Agricultural	9	-	-	\$1,400	\$1,400	-	-
		Vacant	71	-	-	\$4,435,700	\$4,435,700	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Low Hazard	Residential	356	352	\$52,340,800	\$51,245,100	\$103,585,900	848.32	24.93%
		Commercial	39	38	\$8,224,400	\$3,828,500	\$12,052,900	-	-
		Exempt	46	16	\$3,992,900	\$3,178,100	\$7,171,000	-	-
		Agricultural	30	-	-	\$14,200	\$14,200	-	-
		State Assessed	1	-	-	-	-	-	-
		Vacant	82	-	-	\$6,035,200	\$6,035,200	-	-
		<<unknown>>	1	-	-	-	-	-	-
	No Risk	Exempt	2	-	-	\$127,300	\$127,300	-	-
		Minerals	1	-	-	\$300	\$300	-	-
		Vacant	2	-	-	\$76,800	\$76,800	-	-
Unincorporated	High Hazard	Residential	101	101	\$21,218,300	\$16,041,200	\$37,259,500	243.41	7.15%
		Exempt	5	2	\$15,400	\$1,559,400	\$1,574,800	-	-
		Minerals	3	-	-	\$7,600	\$7,600	-	-
		Vacant	30	-	-	\$2,575,900	\$2,575,900	-	-
	Moderate Hazard	Residential	522	509	\$64,276,500	\$70,225,300	\$134,501,800	1,226.69	36.05%
		Agricultural	36	11	\$3,601,000	\$134,400	\$3,735,400	-	-
		Exempt	109	5	\$84,100	\$52,555,500	\$52,639,600	-	-
		Commercial	4	3	\$438,400	\$194,300	\$632,700	-	-
		Minerals	125	-	-	\$406,300	\$406,300	-	-
		Vacant	187	-	-	\$6,495,000	\$6,495,000	-	-
		<<unknown>>	10	-	-	-	-	-	-
	Low Hazard	Residential	155	155	\$28,582,300	\$22,138,000	\$50,720,300	373.55	10.98%
		Agricultural	21	6	\$1,757,500	\$72,900	\$1,830,400	-	-

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
		Exempt	68	4	\$451,900	\$21,770,700	\$22,222,600	-	-
		Commercial	3	3	\$1,568,200	\$449,500	\$2,017,700	-	-
		Minerals	99	-	-	\$328,400	\$328,400	-	-
		Vacant	78	-	-	\$5,243,100	\$5,243,100	-	-
		<<unknown>>	5	-	-	-	-	-	-
	No Risk	Residential	3	3	\$246,200	\$257,700	\$503,900	7.23	0.21%
		Agricultural	2	1	\$9,100	\$16,700	\$25,800	-	-
		Exempt	6	-	-	\$551,300	\$551,300	-	-
		Minerals	2	-	-	\$3,600	\$3,600	-	-
		Vacant	1	-	-	\$665,000	\$665,000	-	-
		Total	2533	1506	\$232,216,300	\$314,003,700	\$546,220,000	3,402.92	

Table N.17. Pinewood Springs Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	Agricultural	2	-	-	\$600	\$600	-	-
		Vacant	1	-	-	\$112,200	\$112,200	-	-
	High Hazard	Residential	19	18	\$2,288,100	\$2,498,300	\$4,786,400	43.38	50.00%
		Agricultural	2	-	-	\$900	\$900	-	-
		Exempt	8	-	-	\$6,122,200	\$6,122,200	-	-
		Vacant	1	-	-	\$80,700	\$80,700	-	-
	Moderate Hazard	Residential	20	15	\$2,327,100	\$2,990,000	\$5,317,100	36.15	41.67%
		Agricultural	6	3	\$1,305,400	\$6,300	\$1,311,700	-	-
		Exempt	17	-	-	\$12,081,300	\$12,081,300	-	-
		Minerals	1	-	-	\$100	\$100	-	-
		Vacant	7	-	-	\$713,800	\$713,800	-	-
	Low Hazard	Residential	2	2	\$694,100	\$356,900	\$1,051,000	4.82	5.56%
		Agricultural	1	-	-	\$2,900	\$2,900	-	-
		Exempt	9	-	-	\$3,744,700	\$3,744,700	-	-
	No Risk	Residential	1	1	\$90,000	\$120,000	\$210,000	2.41	2.78%
		Total	97	39	\$6,704,700	\$28,830,900	\$35,535,600	86.76	

Table N.18. Rocky Mountain Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	Residential	1	1	\$214,400	\$124,100	\$338,500	2.41	0.76%
		Agricultural	1	-	-	\$600	\$600	-	-
		Exempt	3	-	-	\$3,600	\$3,600	-	-
	High Hazard	Residential	43	41	\$10,140,700	\$10,017,300	\$20,158,000	98.81	31.30%
		Agricultural	3	1	\$709,800	\$900	\$710,700	-	-
		Exempt	13	1	\$314,800	\$3,073,800	\$3,388,600	-	-
		Vacant	20	-	-	\$2,095,200	\$2,095,200	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Moderate Hazard	Residential	77	77	\$22,241,700	\$16,604,600	\$38,846,300	185.57	58.78%
		Agricultural	3	2	\$547,800	\$1,000	\$548,800	-	-
		Exempt	14	-	-	\$3,408,900	\$3,408,900	-	-
		Vacant	15	-	-	\$2,474,800	\$2,474,800	-	-
	Low Hazard	Residential	12	12	\$4,661,900	\$3,463,500	\$8,125,400	28.92	9.16%
		Agricultural	1	1	\$614,000	\$300	\$614,300	-	-
		Exempt	2	-	-	\$362,500	\$362,500	-	-
		Vacant	3	-	-	\$602,600	\$602,600	-	-
	Total		213	136	\$39,445,100	\$42,233,700	\$81,678,800	315.71	

Table N.19. Sugarloaf Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	Residential	76	76	\$17,302,000	\$15,637,700	\$32,939,700	183.16	14.37%
		Agricultural	2	1	\$363,300	\$600	\$363,900	-	-
		Exempt	10	-	-	\$1,054,000	\$1,054,000	-	-
		Minerals	9	-	-	\$20,300	\$20,300	-	-
		Vacant	10	-	-	\$681,400	\$681,400	-	-
		<<unknown>>	2	-	-	-	-	-	-
	High Hazard	Residential	112	108	\$18,093,900	\$19,309,300	\$37,403,200	260.28	20.42%
		Agricultural	2	2	\$1,681,000	\$680	\$1,681,680	-	-
		Exempt	18	1	\$18,300	\$1,185,100	\$1,203,400	-	-
		Minerals	53	-	-	\$316,300	\$316,300	-	-
		Vacant	22	-	-	\$1,639,800	\$1,639,800	-	-
		<<unknown>>	3	-	-	-	-	-	-
	Moderate Hazard	Residential	207	204	\$48,728,500	\$45,297,600	\$94,026,100	491.64	38.56%
		Agricultural	9	3	\$1,234,100	\$2,900	\$1,237,000	-	-
		Commercial	1	1	\$66,300	\$29,700	\$96,000	-	-
		Exempt	15	-	-	\$1,789,800	\$1,789,800	-	-
		Minerals	19	-	-	\$57,700	\$57,700	-	-
		Vacant	40	-	-	\$2,965,000	\$2,965,000	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Low Hazard	Residential	141	141	\$33,437,100	\$31,093,000	\$64,530,100	339.81	26.65%
		Agricultural	2	1	\$567,500	\$700	\$568,200	-	-
		Exempt	15	1	\$32,900	\$8,300,900	\$8,333,800	-	-
		Minerals	31	-	-	\$133,900	\$133,900	-	-
		Vacant	22	-	-	\$2,042,900	\$2,042,900	-	-
	Total		823	539	\$121,524,900	\$131,559,280	\$253,084,180	1,274.89	

Table N.20. Sunshine Fire District

Location	Fire Hazard Rating	Property Type	Total Parcel County	Improved Parcel Count	Improved Values	Total Land Values	Total Values	Population Estimate	Percent of Total Pop.
Unincorporated	Very High Hazard	Residential	1	1	\$1,157,200	\$398,400	\$1,555,600	2.41	0.71%
		Agricultural	1	-	-	\$100	\$100	-	-
	High Hazard	Residential	50	50	\$16,052,900	\$16,980,200	\$33,033,100	120.50	35.71%
		Agricultural	3	2	\$290,800	\$500	\$291,300	-	-
		Exempt	8	-	-	\$1,515,200	\$1,515,200	-	-
		Minerals	9	-	-	\$17,900	\$17,900	-	-
		Vacant	9	-	-	\$1,127,300	\$1,127,300	-	-
	Moderate Hazard	Residential	80	74	\$23,735,900	\$24,222,100	\$47,958,000	178.34	52.86%
		Agricultural	3	2	\$1,116,100	\$500	\$1,116,600	-	-
		Exempt	8	-	-	\$952,100	\$952,100	-	-
		Minerals	10	-	-	\$48,100	\$48,100	-	-
		Vacant	8	-	-	\$1,956,100	\$1,956,100	-	-
		<<unknown>>	2	-	-	-	-	-	-
	Low Hazard	Residential	15	15	\$4,917,800	\$5,436,600	\$10,354,400	36.15	10.71%
		Exempt	2	-	-	\$89,700	\$89,700	-	-
		Vacant	3	-	-	\$190,000	\$190,000	-	-
		Total	212	144	\$47,270,700	\$52,934,800	\$100,205,500	337.40	

Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	Sunshine FPD CWPP, Boulder County Comprehensive Plan
Zoning ordinance	Yes	Boulder County Land Use Code
Subdivision ordinance	Yes	Boulder County Land Use Code
Growth management ordinance	Yes	Boulder County Super Intergovernmental Agreement
Floodplain ordinance	Yes	Boulder County Land Use Code
Site plan review requirements	Yes	Boulder County Land Use Code
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Boulder County Land Use Code; Boulder County Building Code; Sunshine FPD's adoption of 2012 International Fire

		Code
BCEGS Rating	Yes	Boulder County, last performed in 2010 - Rating 3/3
Building code	Yes	Boulder County
Fire department ISO rating	Yes	9
Erosion or sediment control program	Yes	Boulder County Land Use Code
Stormwater management program	N/A	
Capital improvements plan	Yes	Capital
Economic development plan	N/A	
Local emergency operations plan	Yes	Sunshine FPD's adoption the Boulder County Emergency Operations Plan
Other special plans	Yes	Sunshine FPD Community Wildfire Protection Plan
Flood insurance study or other engineering study for streams	Yes	FEMA FIS, December 18, 2012
Elevation certificates	No	On file with the Boulder County Transportation Department
Other		

Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Boulder County Land Use	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Boulder County Building Division	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Boulder County Parks and Open Space	
Personnel skilled in GIS	Yes	Land Use; Assessor	
Full-time building official	Yes	Boulder County Building Division	
Floodplain manager	Yes	Boulder County Transportation	
Emergency manager	Yes	Boulder OEM	
Grant writer	Yes	Sunshine FPD Grant Writer	
Other personnel	Yes	Sunshine FPD CWPP Task	

		Force	
GIS Data – Hazard areas	Yes	Boulder County Land Use	
GIS Data – Critical facilities	Yes	Boulder County Land Use	
GIS Data – Building footprints	Yes	Boulder County Assessor	
GIS Data – Land use	Yes	Boulder County Land Use	
GIS Data – Links to assessor's data	Yes	Boulder County Assessor	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Boulder County Communications	Everbridge

Fiscal Mitigation Capabilities

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

Mitigation Actions- Sunshine FPD

Name of action: *Standby Generators at Sunshine FPD's Station 1 and Station 2*

Hazards Addressed: Sunshine FPD (SFPD) has frequent power outages caused primarily by wind and snow. Extended power outages can occur during wildfire events and floods. These power outages affect the ability of SFPD to respond to emergencies and for SFPD's stations to function as command centers during large incidents in either SFPD or surrounding fire districts.

Mitigation Goal or Objective Addressed: Project goal is to provide automatic, standby generators at each of Sunshine FPD's two fire stations. The generators will be sized to provide power to all critical electrical components with load shedding provided as needed to shutoff non-critical electrical loads.

Issue/Background: Sunshine FPD is located in the foothills west of Boulder, CO. Power distribution for both of SFPD's fire stations comes from Four Mile Canyon with the final miles going through rugged, west facing terrain. Power distribution is highly susceptible to interruptions from wind, snow and most recently from wildfire and flooding. In the last five years there has been 12 power interruptions lasting more than 0.1 days. However, more importantly, there have been long duration power outages caused by wildfire in the Fourmile Canyon Fire and the Boulder County flood event in Sept. 2013. SFPD's fire stations were without power for 15 days during the wildfire and 3.7 days during the flood. During both events the stations were being used as command centers and were operating at reduced capacity due to the power outage. Portable gasoline powered generators were used to allow personnel to charge batteries but they presented their own set of issues due to noise, fumes and the inherent risks of extension cords. The portable generators also did not have sufficient capacity to power the station's well pumps leading to unsanitary conditions due to lack of water for flushing toilets, etc.

Other Alternatives: Use of gasoline powered portable generators to power battery chargers, etc.

New or Deferred Action: New

Responsible Office: Sunshine FPD

Priority (High, Medium, Low): High due to life safety issues

Cost Estimate: \$16,000 per station, \$32,000 total project cost. Per station cost estimate breakdown; permit documentation and fees \$400, site preparation \$1800, electrical panels and electrical labor \$6000, generator and automatic transfer switch \$5400.

Existing or Potential Funding: Potential funding from the FEMA Hazard Mitigation Grant Program.

Benefits (avoided losses): Automatic standby generators would allow SFPD's fire stations to operate at full operational efficiency during power outages. This is especially important since these stations are used as command centers during wildfire and flood emergencies. Also, it is important to maintain electrical power during the winter so that the fire station temperatures can be kept above freezing to prevent water from freezing in the fire apparatus.

Potential or current subject matter expertise: Sunshine FPD

Schedule: Completion by the end of 2015

Name of action: Pressurized Hydrants

Hazards Addressed: Lack of a readily available water supply is one of the most critical items facing fire protection districts in Boulder County during a wildfire or structure fire event.

Mitigation Goal or Objective Addressed: Provide a pressurized fire hydrant within the District that provides sufficient flow capacity to quickly fill tenders in support of firefighting.

Issue/Background: Sunshine FPD has made a consistent effort during its history to create a system of fire cisterns throughout the District. In 2006 Sunshine FPD built a new fire station, Station 2. As part of the construction of the station, a 130,000 gallon fire cistern was built in the basement. That cistern along with the other five cisterns in the District, share a common problem in that fire apparatus need to establish a draft to access the water. Depending on the experience of the crew and the quality of their equipment this can be a task that takes 3 minutes or 10s of minutes. With this project, a pressurized hydrant would be constructed which would be gravity fed from the cistern at Station 2. The pressurized hydrant would be located on County Rd. 83. The hydrant would be roughly 300' away from the cistern with a 93' drop in elevation. A 6" pipe would provide a flow of approximately 2500 gallons/minute. There is sufficient room on County Rd. 83 to provide a turnout for the hydrant and there are turnaround points provided at SFPD Station 1 and at the intersection of County Rd 83 and Misty Vale. This would allow a very efficient process and traffic flow for the refilling of fire apparatus.

Other Alternatives: Continue to draft from the cistern.

New or Deferred Action: New

Responsible Office: Sunshine FPD

Priority (High, Medium, Low): High due to life safety issues

Cost Estimate: Current project estimate is \$28,000.

Existing or Potential Funding: None currently identified.

Benefits (avoided losses): A pressurized hydrant that allows access to 130,000 gallons of water would be an extremely valuable resource for Sunshine FPD and its neighboring fire districts. The location on County Rd. 83 could provide a very efficient traffic flow arrangement for refilling fire apparatus. This is sufficient water to make a meaningful difference in fighting either structure fires or wildfires.

Potential or current subject matter expertise: Sunshine FPD

Schedule: Engineering, planning and investigation of funding sources in 2015 and project execution in 2016.

Name of action: Wildfire Mitigation

Hazards Addressed: Large areas of the Sunshine Fire Protection District (SFPD) are shown to have a -9 (most negative impact) on the Colorado Wildfire Risk Assessment portal. The Sunshine FPD (SFPD) Community Wildfire Protection Plan identifies 7 major fire paths driven by west winds which cross the District. These fire paths not only threaten SFPD, they also threaten Pine Brook Hills, Boulder Heights, Carriage Hills and the Four Mile Creek Drainage.

Mitigation Goal or Objective Addressed: Perform ongoing wildfire mitigation activities as outlined in the Sunshine FPD CWPP document. These activities include:

- Creating and maintaining shaded fuel breaks along SFPD's District roads.
- Assisting residents in performing D-space work on their properties.

- Performing community chipping events each year which provide free chipping services to residents to assist them in their wildfire mitigation work.

Issue/Background: In September 2010 the Fourmile Canyon Fire destroyed over a third of the homes in the Sunshine FPD. One of the significant findings from the fire was that wildfire mitigation was the determining factor in home survivability during the fire. SFPD has been actively performing wildfire mitigation work since 2009 when the residents in Sunshine voted for a mill levy dedicated to funding wildfire mitigation. The District has also been very active in pursuing federal, state and county grants to support the wildfire mitigation work.

Other Alternatives: None

New or Deferred Action: Ongoing

Responsible Office: Sunshine FPD CWPP Committee

Priority (High, Medium, Low): High due to life safety

Cost Estimate: Maintenance of existing fuel breaks is expected to cost \$500 to \$1000 per acre and creation of new fuel breaks is expected to cost \$1400 to \$2000 per acre. D-space work around resident's houses typically range from \$1500 to \$3000 per residence depending on topography and fuel density. Community chipping events typically cost between \$5000 and \$8000 depending on participation. In the last two years SFPD has been performing two chipping events per year, spring and a fall. Yearly spend is a function of CWPP tax income, grants and resident's donations. In recent years the wildfire mitigation costs have ranged from \$50,000 to \$94,000 per year.

Existing or Potential Funding: SFPD has a mill levy dedicated to wildfire mitigation. The District is currently working under an existing Wildfire Risk Reduction Grant from the Colorado Dept. of Natural Resources. It will also pursue grants from the Colorado State Forest Service and Boulder County.

Benefits (avoided losses): SFPD has 125 structures with an estimated value of \$86M including structure and contents. That averages to a per residence cost of \$687k.

Potential or current subject matter expertise: Sunshine FPD CWPP Committee

Schedule: Ongoing based on priorities established by the SFPD CWPP Committee.

